NOVEMBER, 1960

TRAFFIC ENGINEERING

- Aging and Driving
- For Seven Cents Trafficwise
- Design of Signal Systems

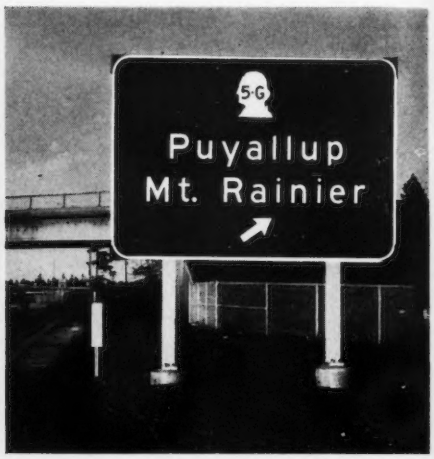
INSTITUTE OF TRAFFIC ENGINEERS
ITE
FOUNDED 1930

3M COMPANY
Reflective Products

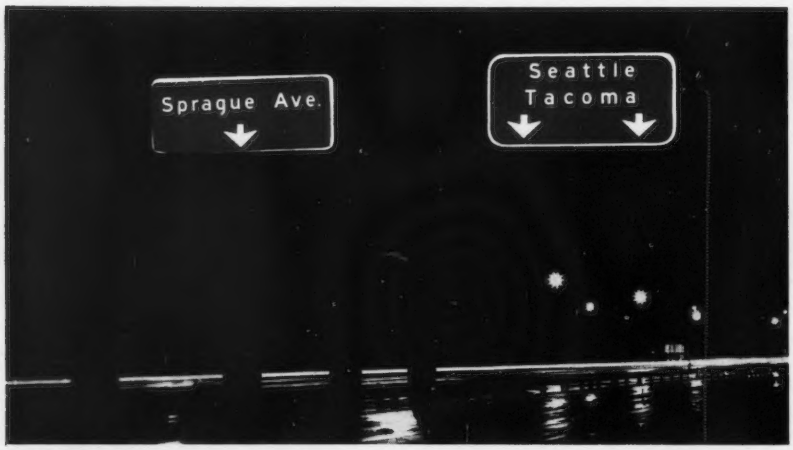
signing
NEWS AND VIEWS

From the makers of "Scotchlite" Brand Reflective Sheeting, "Codit" Brand Reflective Liquid and other reflective products for modern traffic control and safety

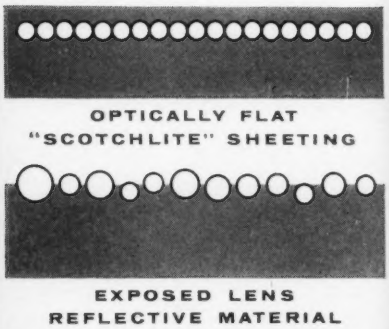
WHY WASHINGTON'S GREEN SIGNS DON'T BLACK OUT ON RAINY NIGHTS



ALL-WEATHER reflective signing is as necessary as all-weather roads in the State of Washington. Above left is a guide sign on Interstate Highway 99, near Tacoma, photographed immediately after a rain. A film of water still covered the sign's face—but it had no visible effect on the brilliant performance of the signing material: "Scotchlite" Reflective Sheeting. Optically flat "Scotchlite" Sheeting is the long-time choice of the Washington State Highway Department for signs that *must* be seen in their true color and shape at all hours, in all kinds of weather.



HIGH ABOVE Washington's Interstate 99, overhead signs of green "Scotchlite" Reflective Sheeting are colorfully visible—come rain or clear skies. Green for guide signs is no newcomer to Washington. It was adopted for use on state roads over 5 years ago. Motorist reaction has been enthusiastic from the start.



SMOOTH-SURFACED "Scotchlite" Sheeting does not black out in the heaviest rain. Water will, however, alter the optical focus of exposed lens material, causing almost a total loss in reflection. For more details, ask your 3M Representative or write:

3M Co., Reflective Products Division, Dept. RBI-110, St. Paul 6, Minn.

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

THE TERMS "SCOTCHLITE" AND "CODIT" ARE REGISTERED TRADEMARKS OF THE 3M COMPANY

The DUNCAN V.I.P.*

...like having a *POLICEMAN* at every meter!

Twenty-four hour a day protection to collected revenue can only be achieved by a meter specifically engineered to handle this tough assignment. Spectacular results prove the Duncan V.I.P. will affect substantial savings in parts costs plus increased revenue through effective vandalism control.

TIME EXPIRED
Submerged mystic-lock* increases security to the coin compartment. Non-exposure virtually eliminates malicious lock area vandalism.
Trade Mark

***Vault Insured Protection against vandalism**

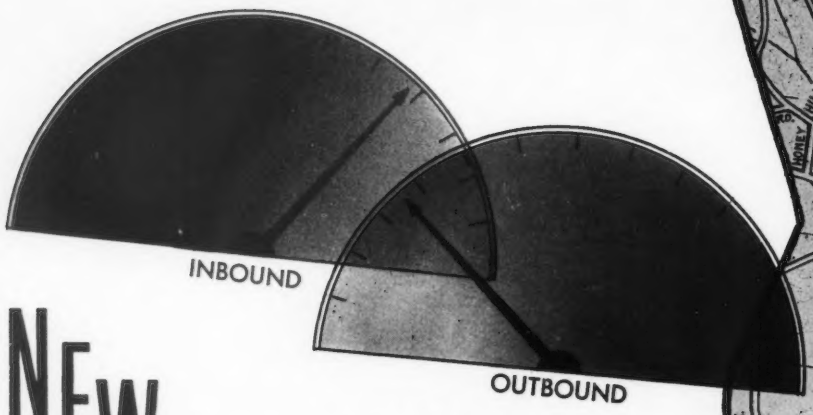
Check these outstanding protection features:

- TAMPER-PROOF BOLTED DOOR
- BURGLAR-RESISTIVE HOUSING
- PATENTED SEALED COIN BOX

DUNCAN PARKING METER

Division of Motor Products Corporation

835 NO. WOOD STREET CHICAGO 22, ILLINOIS



NEW TM SYSTEM

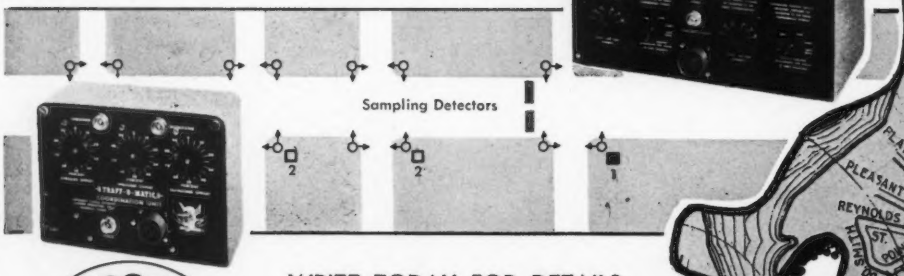
provides traffic-actuated signal control for arterial flow . . . automatically . . . for less money

The TRAFF-O-MATIC® TM SYSTEM is a traffic-actuated, 3-offset, 3-cycle length system that provides a low cost method of arterial signal control. It responds to *actual* traffic changes *without time clocks . . . . . without program drums.*

Continuously and automatically the TM System seeks and selects the most favorable offset and cycle length combination based on the relative volume levels of two sampled directions of traffic flow. Operating adjustments are made without tools. Circuitry and component construction incorporate the latest design techniques for maximum service and ease of maintenance.

1 ■ TRAFF-O-MATIC MASTER MODEL TM-1 maintains continuous inbound-outbound volume comparison . . . automatically selects one of three offsets to best serve traffic flow, in addition to free operation at low volumes.

2 □ TRAFF-O-MATIC COORDINATING UNIT MODEL TM-21, one with each local semi-actuated controller, interprets Master's offset instructions . . . easy knob adjustment of three offsets . . . each offset can be assigned an individual background cycle length.



WRITE TODAY FOR DETAILS

ELECTRO-MATIC® CONTROL — TRAFFIC ACTUATED

AUTOMATIC SIGNAL DIVISION

EASTERN INDUSTRIES, INCORPORATED
NORWALK, CONNECTICUT

TRAFFIC ENGINEERING

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

Vol. 31 NOVEMBER, 1960 No. 2

INSTITUTE OFFICERS

A. F. MALO
President

GORDON K. GRAVELLE
Vice-President

ROBERT A. BURCH
Vice-President

J. AL HEAD
Secretary-Treasurer

DIRECTORS

A. L. HUTCHISON
District Number 6

FRED W. HURD
District Number 1

FENTON G. JORDAN
District Number 5

O. K. NORMANN
District Number 2

EVAN E. OLMSTEAD
District Number 4

HERBERT B. WOODLING
District Number 3

EDWARD G. WETZEL
Immediate Past President

PUBLICATION STAFF

DAVID M. BALDWIN
Editor

REBEKAH FRIEBELY
Managing Editor

G. A. BACCHUS
J. W. CHAMBLISS
C. C. CLARK
WM. E. CORGILL
R. E. DUNN
M. J. HUBER
E. A. MUELLER
C. C. ROBINSON
S. T. SIEGEL
BURT WHEDON
Associate Editors

CONTENTS

FEATURES

Aging and Driving 11
Burton W. Marsh

For Seven Cents Trafficwise 30
Paul L. Streb

Design of Signal Systems by Graphical Solutions 32
B. M. Davidson

NEWS

Coming Events 38
Traffic News 38
New Appointments 43
Strictly Business 45
New Publications 63

TECHNICAL NOTES

Prerequisites and Scope of Examinations For City and County Traffic Engineering Positions 47

INSTITUTE AFFAIRS

Secretary's Column 53
Section News 63
New Members and Transfers 64
Yearbook Changes 66
Membership Applications 67

MISCELLANEOUS

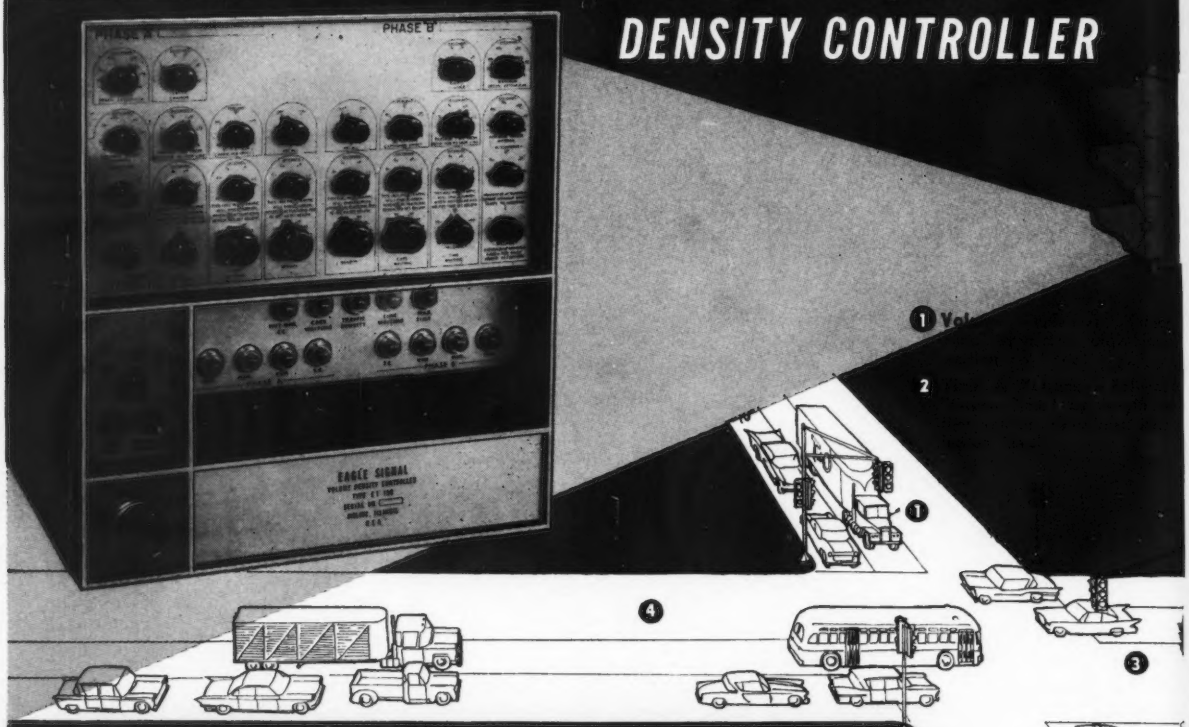
Positions Available 50
Index to Advertisers 70
Professional Service Directory ..... 70 & 71

Cover: An overhead advance guide sign on Interstate 195 in Rhode Island. External lighting luminaires are almost invisible.
—Photo from Pfaff & Kendall—Traffic & Street Sign Co.

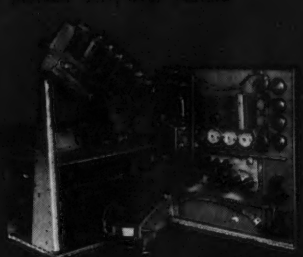
TRAFFIC ENGINEERING is published monthly by the Institute of Traffic Engineers. Editorial offices are at 2029 K Street NW, Washington 6, D.C. Advertising plates should be sent to Interstate Printing Corp., 400 Watchung Avenue, Plainfield, N. J. Advertising representatives: New York—Seymour A. Robbins & Associates, 489 Fifth Avenue, N. Y. 17. Chicago—Scott Kingwill & Associates, 35 E. Wacker Drive, Chicago 1. Los Angeles—Jess M. Laughlin Co., 711 South Vermont Ave., Los Angeles 5. Printed in U.S.A. Second class postage paid at Plainfield, New Jersey. ¶Single copies 50 cents, subscription price $4.50 per year in the United States and Canada; $5.75 per year to foreign countries.

The Institute is not responsible for any statements made or opinions expressed in its publications. Publication of advertising does not constitute Institute approval or endorsement of the products or services advertised. Permission to reprint contents with customary credit line is given unless otherwise stated. The Institute seal, pictured at the upper left on this page, is a Registered Trade Mark of the Institute of Traffic Engineers.

NEW EAGLE ET150 TWO-PHASE FULL-ACTUATED, VOLUME-DENSITY CONTROLLER



BALANCES "GREEN TIME" AT SUIT TWO-STREET INTERSECTIONS FOR MOST EFFICIENT TRAFFIC FLOW



EAGLE SIGNAL • Moline, Illinois
A DIVISION OF THE GAMEWELL COMPANY, AN E. W. BLISS COMPANY SUBSIDIARY

Eagle Equipment Saves Lives — Saves Time

EAGLE SIGNAL COMPANY, Municipal Division
Dept. TE-1160, MOLINE, ILLINOIS

Please send me complete specifications on the new EAGLE ET150 Two-Phase, Full-Actuated, Volume-Density Controller.

NAME AND TITLE

ORGANIZATION

FULL ADDRESS

Frankly Speaking . . .

THE TRANSPORTATION COMPLEX of any community has been aptly described as the bloodstream through which the economic life of the community receives its nourishment. As communities grow and prosper its people demand and need more and better transportation service. This is particularly true in the downtown areas which have suffered most acutely from the lack of off-street parking spaces, additional arterial routes, and adequate public transportation.

Traffic engineers have consistently advocated the need for improvement in both public transit and private automotive transportation. Yet, some of our colleagues in the field of planning and related activities have proposed, as solutions to the downtown transportation problem, the creation of pedestrian malls which would close important traffic arteries to vehicular traffic and the barring of private automobiles from large sections of the downtown area. The net result of such plans, of course, will be to reduce transportation service to the downtown area.

These fuzzy-minded theories are based upon the premise that the private car is a curse to the downtown area and, therefore, should be eliminated. Such an approach erroneously assumes that we can force anyone who wants to come into our downtown area to use mass transit. Experience has shown that when a community fails to provide the type of transportation demanded by the public—the public takes its business elsewhere.

The sad part of this ridiculous position is that it appeals to a vocal minority and stymies forward-thinking, constructive projects that are essential to a sound and adequate solution to the transportation problem in the downtown business districts. It is time for traffic engineers to stop chuckling at what we consider to be outlandish suggestions and to point out the basic errors in thinking that proposes to stop the development of off-street parking facilities, to close off important traffic arteries and to eliminate the use of private cars as a means of providing better transportation.

GORDON GRAVELLE
Vice President
Institute of Traffic Engineers

SAFE-T-POST

TRAFFIC GUIDES

Eliminate confusion
. . . by guiding traffic
safely into difficult areas
. . . quickly . . . simply.

Only your imagination limits their use!

. . . At dangerous intersections . . . dual highways or single lanes.

. . . In garages, parking lots, service areas, toll roads.

Solid, permanent-appearance commands motorists' respect wherever SAFE-T-POSTS are installed. Made of tough, durable, full-color plastic that continues to take excessive abuse . . . SAFE-T-POSTS literally "snap-back" when hit by careless motorists.

Made by the manufacturers of World-Famous

SAFE-T-CONE
TRAFFIC GUIDES

RADIATOR SPECIALTY COMPANY
CHARLOTTE, NORTH CAROLINA

CLIP AND MAIL

SPECIAL OFFER! $1 buys your first "Safe-T-Post"

Clip out this coupon, attach one dollar, and mail to us on your letterhead to receive your sample for careful examination.

NAME _____ TITLE _____

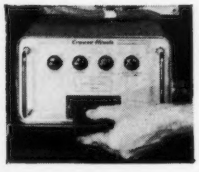
ADDRESS _____

NOW...

the world's most advanced vehicle-actuated

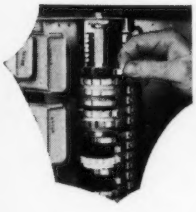
ELECTRONIC TRAFFIC CONTROLLERS

CROUSE/HINDS Vehicle-Actuated Electronic Traffic Controllers are designed to provide the choice of basic controller and accessories that will give you the most efficient command of any specific intersection. There is a choice of 3 basic controllers to meet the needs of any intersection, with provision for future modifications built in.

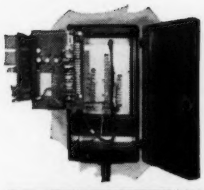


ONE OR MORE PLUG-IN ACCESSORIES expand functions of basic controller, without change in main timer, or addition of relays. Front of each unit has disconnect plug for easy removal.

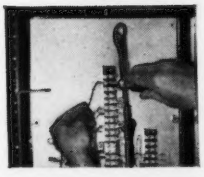
COMPLETE RANGE OF TIE-IN and Modifying Accessories provides all operations called for by engineers coping with today's traffic complexities. (All are compatible with existing systems.)



CAMSHAFT CONSTRUCTION reduces number of relays to *minimum* . . . permits a wider range of modifications before resorting to special accessories . . . without changes in timer or wiring.



"OPEN BOOK" CONSTRUCTION of Crouse-Hinds Controllers gives ready accessibility for all maintenance, installation and adjustment procedures.



ONE BASIC TIMER with one standard set of wiring handles all jobs. All modifications not made by simple cam adjustment are obtained by plug-in accessories without complicated rewiring.

JACK-MOUNTED RELAYS eliminates wiring for replacement. Just pull relay from jack and slip in new relay. Fewer number of relays reduces maintenance headaches to a mere fraction.

COMPLETE TECHNICAL INFORMATION on the Crouse-Hinds series of Vehicle-Actuated Electronic Traffic Controllers is yours at the drop of a postcard. Literature by return mail.

CROUSE/HINDS
SYRACUSE / NEW YORK

OFFICES: Atlanta Baton Rouge Birmingham Boston Buffalo Charlotte Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington
RESIDENT REPRESENTATIVES: Albany Baltimore Reading, Pa. Richmond, Va.
Crouse-Hinds of Canada, Ltd., Toronto, Ont. Domex, Mexico City, D.F. Peterco, Sao Paulo, Brazil

SIGN-MAKING IS EASY WITH STIMSONITE® LETTERS

You can lay out signs on the spot with Stimsonite letters—you don't need costly production equipment or special fasteners.

The unequalled readability of Stimsonite cutout letters, day or night, in all kinds of weather, has been proved by years of service. The wide range of alphabets offered by Stimsonite is unequalled, too. For your signing needs, you can choose from over 1000 different letters and accessories—ranging from 4 inches to 30 inches in height—capitals or upper and lower case.

Get the whole story. Write today for Bulletin S-4C on spacing rules and letter dimensions.

STIMSONITE®

STIMSONITE SIGNAL DEVICES (AGA 1909-1959)

ELASTIC STOP NUT CORPORATION OF AMERICA

1027 NEWARK AVENUE • ELIZABETH 3, NEW JERSEY

The Matson Award Paper

Aging and Driving

By Burton W. Marsh
Director, Traffic Engineering and Safety Department
American Automobile Association
Washington, D. C.

This paper was presented in response to the 1960 Theodore M. Matson Memorial Award at the 30th Annual Meeting of the Institute of Traffic Engineers, Chicago, Illinois, September 12, 1960.

"NO MAN is an Iland, intire of it selfe . . ." In accepting the Theodore M. Matson Memorial Award, I recognize that such contributions as I have made and whatever services I have performed in the field of traffic engineering, have been possible because of many others including my tolerant and understanding wife; stimulation, guidance and counsel from many keen, inquiring minds; encouragement and support from employers; teamwork with numerous splendid associates—including, for productive and happy years in Philadelphia, our respected and admired Ted Matson.

This Award has unusual significance to me. I have great respect for the members of the Board of Award. The concept of the award, in honoring Theodore M. Matson, is splendid. But it is my cherished personal closeness to Ted Matson, through our professional partnership and otherwise, which is most in my mind and heart at this moment.

It was a wonderful privilege to work for three years side by side with one of the most outstanding pioneer leaders in traffic engineering—in its broadest and deepest connotation.

Always a searcher for truth, he pressed quickly to the heart of a subject. He constantly sought new basic principles and concepts, and urged broadened horizons for professionals in traffic engineering. A prodigious worker, he always wanted to do a thorough job, and to "plow new ground." The importance of high-quality professional education always impressed him strongly. His constant regard for others was outstanding—and he always had a keen desire to help younger engineers. Pettiness and narrow-mindedness, whether by politicians or others, he had no time for.

With all his high professional qualifications and standards, Ted Matson was most human and personally likable—with a lively sense of humor and a great enjoyment of fellowship. Many were the happy times Ted and his fine wife, Naomi, and the Marshes had together, often with other friends, too. His strong, deep singing voice is still fresh in my mind.

Theodore Matson was a real man—and it is most appropriate that there is a continuing program of honoring him and recognizing his outstanding contributions to traffic engineering and highway transportation.

As to the preparation of this paper, I acknowledge with appreciation the valuable assistance of my associates, Sam Yaksich and Earl Allgaier. Special appreciation is also expressed to Dr. Theodore W. Forbes, outstanding in research, including human behavior, he very kindly reviewed this paper and made several valuable suggestions, which have been incorporated.

Thesis of Aging and Driving

This is my thesis: new dimensions and future outlook call for greatly increased attention to a neglected area of highway transportation—*the aging driver*. That is why, many months ago, I chose for this paper the subject "Aging and Driving."

Undertaking study of the matter, I quickly found that very little had been done. This is understandable. For until recently, while aging drivers were in the picture they were a relatively small and unobtrusive part of it—and there were many other pressing problems.

Recently this situation has been changing substantially. Today, the aging driver is a significant factor in traffic, and he will steadily become a more important factor. For his numbers are already growing very much faster than total number of drivers, and for several reasons this large growth will continue for years.

It is now time that very much more attention be devoted to the aging driver—the subject can be ignored or minimized only at risk of serious consequences!

For there are problems—and not minor in importance—relating to the aging driver, and these must be solved. Research must be expedited. Public policies and programs must be established. Public support must be attained.

Many older persons are excellent drivers. Yet in terms of miles driven, older drivers appear to have considerably more frequent involvement in highway accidents than middle-aged persons, though far too few mileage-rated analyses have been made.

Many older persons want to continue to drive as long as they are capable of safe driving. Public policy should be based on helping aging drivers continue to drive enjoyably and safely, so long as they can do so competently—without unreasonable hazard to themselves and others. Much can be done to this end, through cooperative action programs among several disciplines.

On the other hand, public policy must likewise call for cessation of driving when, with advancing years (or otherwise), driving competence is no longer adequate.

Chronological age is NOT a sound criterion for appraisal of driving competence. "Functional age" is far better

(Author's Note: This is an entirely personal paper. It is not to be interpreted as necessarily expressing or affecting policies of the American Automobile Association.)

but to date there do not exist proved ways of establishing this.

Thus, for most aging persons, there is a "capable driving span of years." It varies greatly among people. Ways and means of identifying its limits must be found.

Clearly we need to study and understand the aging person much more fully—especially as to those factors which affect his competence in traffic. Numerous changes with aging—after a *now* generally not so low age as formerly—have potential detrimental effects on driving competence. Yet, corrections and compensations can be and often are made for many of these. Some changes with aging are beneficial as to driving safety.

There is now need for the development of a whole SENIOR DRIVER PROGRAM, of many parts. This will require the active participation of many different groups. A prerequisite to the development of such a program is an awakened realization of the need and opportunity—and then the dedication of manpower and brainpower to the challenging problems related to aging and driving.

An Interesting Illustrative Case

The Social Security Administration, as part of its research to observe its twenty-fifth birthday on August 15, 1960, sent field men out to interview 130 recipients of social security benefits who have passed the century mark. One of these is Judge Albert Alexander, of Plattsburg, Missouri. He will be 102 in November.

Judge Alexander, the interviewer found, is still driving to work six days a week, and is serving his third straight elected term as magistrate and probate judge.

I talked to the judge. He verified that he drives daily to work. But *more!* He has NEVER had an accident. He enjoys driving. A year ago, he and his daughter took turns (and answering my question, the judge said his part was at least half) on an automobile trip into southern Missouri totaling four to five hundred miles. A few days ago, he said his daughter was to take a train back to California, where she teaches—and she was to leave from a station 30 miles away. "We drove over —then I drove back—got back just before dark—enjoyed the trip," said the judge. When I thanked him and said good-by, he came back with "Be Careful!"

Here is one case which illustrates important parts of this subject. Here is a senior citizen who at 102 is a safe driver. Clearly he wants to continue to drive. He seems alert and in no sense senile. Is there any reason for organized society to deny him the opportunity to drive *as long as he continues to be competent?*

This age matter is not simple! I found numerous references to this point. Perhaps Curlson and Stieglitz stated it as well as any: "We know people who are biologically, mentally and functionally relatively young at 70 and others who are relatively senile in their early 50's."

"Aging" and Age Basis Used in This Paper

What is "aging?" Various medical and other authorities studied have differing definitions or descriptions.

For this paper, the following quotation from the explanatory statement on maximum age limitation for pilots, in the June 27, 1959 Federal Register, seems satisfactory:

> ". . . the process of aging can be considered as a progressive deterioration of certain important physiological and psychological functions."

Other references mention "decrease in reactivity of the system," "changes affecting performance," a period in which losses exceed gains.

Clearly, no chronological age is a satisfactory criterion as to continuing driving competence. For, as Dickens said: "Father Time is not always a hard parent, and, though he tarries for none of his children, often lays his hand lightly on those who have used him well"—or, might be added, those having the right progenitors.

In this connection, one is reminded of Justice Oliver Wendell Holmes, at the age of eighty-seven, viewing a pretty girl and remarking: "Oh, to be sixty again."

It is not chronological age but "functional age" which should receive attention. Unfortunately, there exist no suitable criteria for determining functional age.

In much of the literature studied, chronological age is used. Hence, as a matter of convenience and in accordance with many of the papers studied, the age group 65 and over is that most used in age-oriented presentations relating to aging in this paper.

Population Growth Comparisons

Since 1900, U. S. population has doubled, but the number of persons aged 65 and over has almost quintupled (see Chart 1). The percentage of the total population which is 65 and over, was 4.1 in 1900 and is some 8.8 now.

What of the future? As Chart 1 shows, whereas there are some 15.5 million 65 and over today, by 1980 it is estimated that there will be a whopping 25 million. *Today, a thousand persons reach age 65 each day.* Chart 2 shows how very much faster the part of our population 65 and over has been increasing since 1930, compared to total population. Future predictions also shown on Chart 2 indicate a continuation of this marked trend.

Chart 3 shows the variation in the rates of increase in population by selected age group and by sex. Note the generally larger increases from age 65 up—also the markedly greater increases of women compared to men. By 1975, it is estimated that in the 65 and over group, there will be 138 women to 100 men.

Why the great increases in older persons? Well, average life expectancy at birth has increased from 49.2 years in 1900 to 69.3 years in 1957. But a major factor has been the outstanding reductions in deaths from infectious diseases. The important sociologic fact is that very many more people are living to become old. "*This relative shift of proportionately more individuals to the seventh and eighth decades of life provides the basis for the increasing importance of problems associated with aging.*"

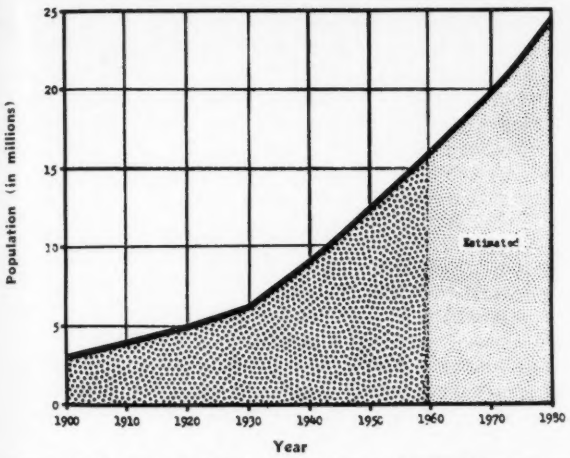
Growth Comparisons for Licensed Drivers

Between 1940 and 1959, U. S. population increased some 35 per cent. During the same period, the number of licensed drivers increased some 79 per cent, or *more than twice as fast.*

In the same 1940 to 1959 period, the percentage of U. S. drivers aged 65 and over is estimated to have increased from some 3 per cent to about 6.8 per cent, as is shown in Chart 4. This means that there were four times as many drivers aged 65 and over in 1959 as in 1940—1.36 million in 1940 and 5.71 million in 1959. (See Chart 5)

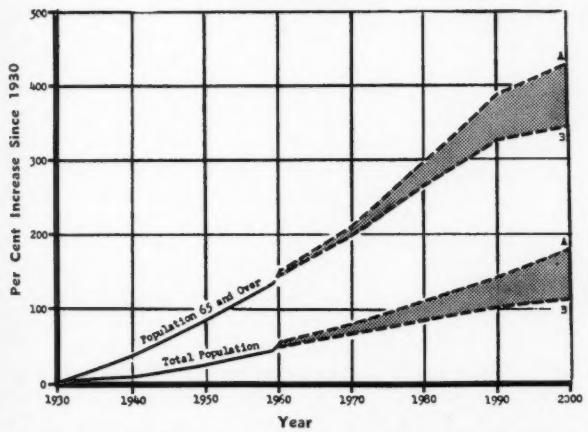
Chart 6 shows the changing pattern of age distribution of drivers for 1940, 1950, and 1959.

Chart 1
Growth of U. S. Population 65 Years of Age and Over



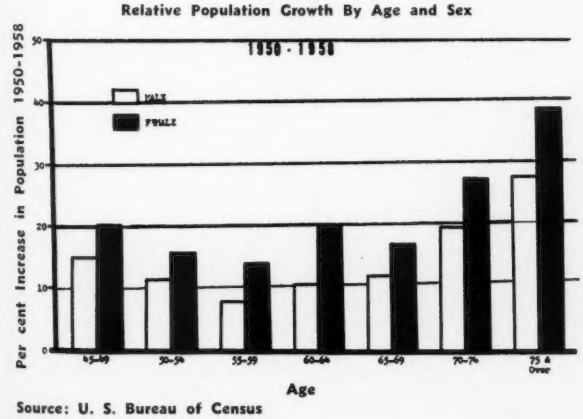
Source: Public Health Service, U. S. Department of Health, Education, and Welfare.

Chart 2
Percentage Increase of U. S. Population 65 and Over Compared to That For Total Population



A. Population projection of low fertility and high mortality assumptions.
B. Population projection of high fertility and low mortality assumptions.
Source: "The Aged and Aging in the United States." Report by the Subcommittee on Problems of the Aged and Aging, Committee on Labor and Public Welfare, U. S. Senate Report No. 1121, 86th Congress, 2nd session.

Chart 3
Relative Population Growth By Age and Sex



Source: U. S. Bureau of Census

Chart 4
Comparison of Percentage of Total Drivers 65 Years and Over

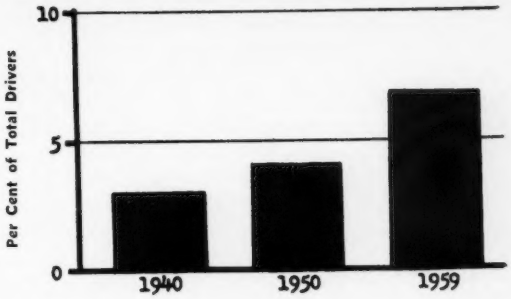
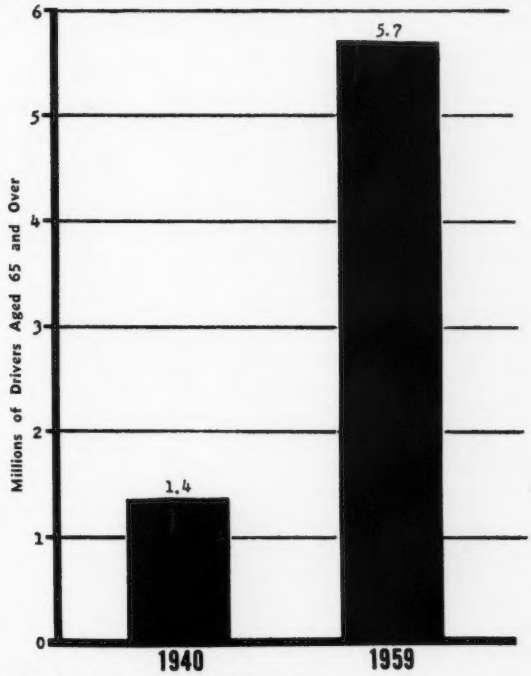
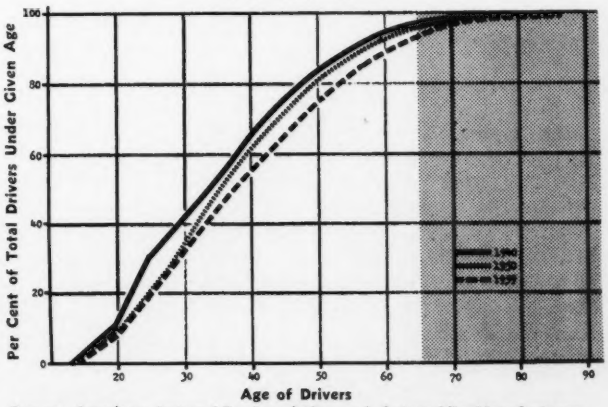


Chart 5
Estimated Number of U. S. Drivers Aged 65 and Over in 1940, 1959



Source: American Automobile Association

Chart 6
Comparison of Percentages of Total U. S. Drivers by Ages 1940, 1950, 1959



Source: American Automobile Association and Automobile Manufacturers Association.

As a further check, the appreciated cooperation of the American Association of Motor Vehicle Administrators was obtained in seeking states which had made analyses of the distribution of their licensed drivers by ages. It was hoped to obtain such comparisons for a wide range of years. Unfortunately, such comparison data were not available. However, several states had made such an age distribution study in the past.

Wisconsin had the earliest such age distribution reported—for 1947. Through the good offices of the Wisconsin Division, AAA, the appreciated assistance of the Motor Vehicle Department was obtained to provide comparable age distribution data for the present.

Chart 7 shows that the percentage of all licensed drivers who were 65 and over increased from 5.9 in 1947 to 8.8 in 1960. There were 1.7 times as many drivers in Wisconsin aged 65 and over in 1960 as in 1947!

Chart 8 is even more striking. It shows that while the number of all other licensed drivers in Wisconsin increased 8.8 per cent from 1947 to 1960, the number aged 65 and over increased 65.9 per cent! That means that this increase was 7 times as great. While their proportion of all Wisconsin drivers is still small, persons 65 and over constitute a growing and significant group.

Moreover, for a long time to come, large growth in numbers of drivers aged 65 and over is to be expected.

Factors Affecting Growth in Numbers of Aging Drivers

What are the reasons for large—and all too little realized—growth and anticipated growth in numbers of drivers aged 65 and over? Here are some of the factors favorable to such growth:

1. The effect of the calendar (or of Father Time) in relation to the years when automobile driving began growing by leaps and bounds. It wasn't until the mid-twenties that the numbers of motor vehicles and drivers really started to zoom upward. Large proportions of those drivers were fairly young. These are only now becoming "65 and over." And such numbers will increase greatly as registrations from then on increased.

2. The strong desire of great numbers of people to continue to drive, well past age 65.

3. The greatly increasing numbers of persons living to old age.

4. The oncoming greatly increasing numbers of women drivers reaching 65 years. See Chart 9 (based on studies by the Bureau of Public Roads in the mid-fifties) and note in the 20-29 and 30-39 age groups particularly, the relatively high proportion of women drivers. Remember, too, that women live longer than men.

5. The increasing proportion of the population becoming drivers.

6. Improving health, including those in their sixties and above. This means that more will decide that they are competent to continue to drive, and as checked by doctors and authorities, more will be so adjudged.

7. Improving economic status of many who are and become 65 and over. True, there will be considerable numbers who will find it economically unwise or impossible to continue to drive—but the numbers who can afford to drive will increase substantially.

8. Much more leisure as shorter work-weeks come for many still employed and as the effect of increasing retirement plans and other benefits result in many more retirements at about age 65. One of the popular uses of leisure will be driving.

9. Good roads in increasing mileages, which make driving more attractive.

10. Generally easy availability of needed and desired services along the road or nearby.

11. Cars which are dependable, simple to operate, and which, with power steering and braking, require only slight physical exertion to drive.

12. The great and growing dispersion of places of residence in suburban areas. While some older folk will move in where public transportation service is more frequent, others who prefer to remain in suburban locations will need cars and will continue to drive.

There are also factors which reduce driving by older persons, or cause them to stop driving. It is well to keep these in mind, too. Here are some:

1. Impairments in health. These can become so serious that persons cannot drive, or decide that they should not continue to drive.

2. Economic problems. Many older folk will not be financially able to retain a car, and others may choose to use limited resources in other ways.

3. Diminishing driving competence. For various reasons, driving competence may diminish to an extent that (a) the person himself decides to stop driving, (b) members of the family or friends may persuade the person to stop driving (though this is usually not easy!), (c) driver license authorities may on re-examination find that for protection of the individual and of others, his driving privilege should be terminated.

4. Automobile insurance difficulties. The older driver may have trouble in renewing his automobile insurance—as, for example, because of accident record—and this may cause the individual to stop driving.

5. Decreasing self-confidence. Some older persons lose confidence as to their ability to continue to drive—especially as traffic grows heavier, speeds in certain places (as on freeways) increase, multi-lane traffic with its complications becomes more and more common.

It seems reasonable to assert that for a large proportion of persons aged 65 and over, there is a substantial "capable driving span of years" ahead. Its duration will vary greatly among persons. The outlook appears clear that for years into the future there will be large—very large—increases in the numbers of drivers aged 65 and over.

Sex of Aging Drivers

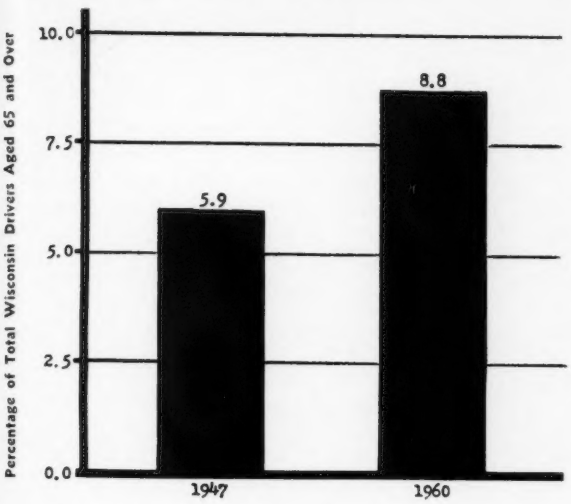
Chart 9 shows that in the mid-fifties, when these data were collected, and for some years, the predominance of men among drivers aged 65 and over, will be marked. For drivers 70 and over, there were nearly five times as many men as women. For ages 60-69, there were over three times as many. Where there are significant differences between the sexes as to driving or differences as to best approaches, this male predominance should be borne in mind.

However, this sex proportion is destined to change very considerably. For women are more extensively becoming drivers. This change is naturally occurring more among the younger drivers. Note in Chart 9 how much nearer equal are proportions of males and females in age groups 20-29 and 30-39. The 40-49 age group shows proportionately many more women than for groups aged 60 and above. If, as seems reasonable, large proportions of these younger women continue to drive, the change for the 65 and over group will eventually be marked.

But in addition, according to private driving school experience which has

Chart 7

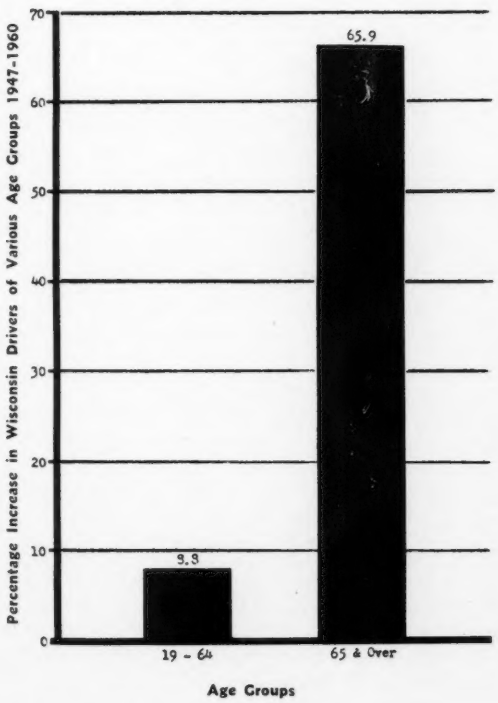
Percentage of Wisconsin Drivers Aged 65 and Over 1947, 1960



Source: Wisconsin Motor Vehicle Department.

Chart 8

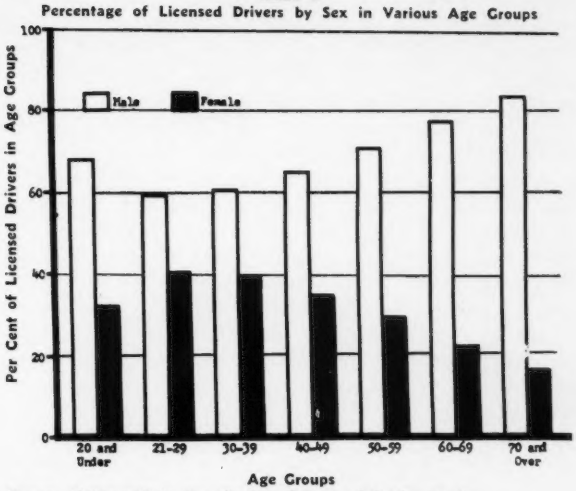
Contrast of Percentage Increase of Wisconsin Drivers by Age Groups 1947-1960



Source: Wisconsin Motor Vehicle Department.

Chart 9

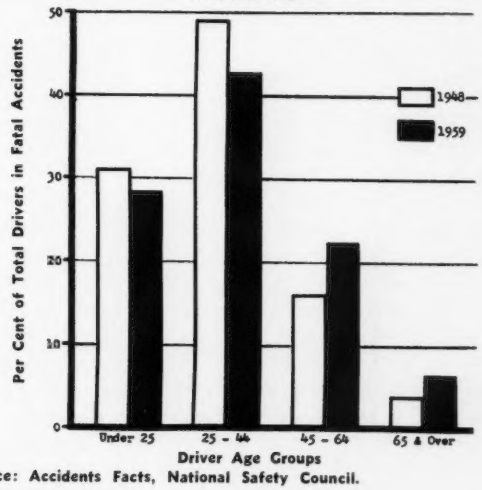
Percentage of Licensed Drivers by Sex in Various Age Groups



Source: Motor-vehicle Use Studies, Bureau of Public Roads.

Chart 10

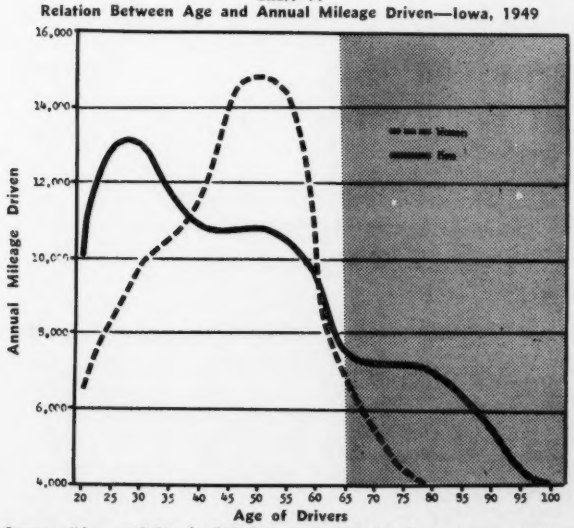
Comparison of Percentages of Drivers in Fatal Accidents by Age Groups 1948 and 1959



Source: Accidents Facts, National Safety Council.

Chart 11

Relation Between Age and Annual Mileage Driven—Iowa, 1949



Source: "Age and Sex in Relation to Accidents," A. R. Lauer, Highway Research Bulletin 60, 1952.

come to my attention, they are finding very much larger numbers of women learners at practically all ages. If that experience is typical, the shift just mentioned will be accelerated.

Traffic Accidents Involving the Aging

Astonishing as it may seem, very few satisfactory studies are available of traffic accidents by driver age. Chart 10 shows that in 1959, drivers 65 and over were involved in 6.5 per cent of fatal accidents. The National Safety Council table from which the data were obtained indicates that drivers aged 65 and over constituted 6.7 per cent of all licensed drivers. One might conclude that these facts show that aging drivers are safer drivers. That assumption is not justified, however, and this is an excellent example of the danger of drawing erroneous conclusions from facts, by failing to take account of significant additional matters.

In this case, the National Safety Council is careful to point out, in the footnote to its table, that their information is in terms of numbers of drivers; "a better measure would relate accidents to miles driven, but data on this item are not available."

Chart 11 helps show why it is important to consider the number of miles driven, for various age groups. Note that annual miles driven at the time of that study of replies from 1419 Iowa drivers—apparently in 1948 or 1949—dropped off sharply at the later driver ages. It may well be that this drop-off is less marked now and will become less yet. However, the basic fact will remain that there will be large differences in mileages driven among the various age groups. Unfortunately, no similar, more current, data were found.

Considerable effort was made to find data relating accidents to age and miles driven. Only two such analyses were found—one by Dr. A. R. Lauer based on the above-mentioned 1948-49 Iowa study; the other by the Bureau of Public Roads based on extensive field studies in 1957-58.

Chart 12 presents findings from the Lauer study. Note that accidents per 100,000 miles driven increased sharply for both men and women after about age 60. Note, too, that the rates for women above age 55 are substantially higher—a finding which will surprise many.

Chart 13 is based on BPR studies of rural daytime accidents on 600 miles of main roads in eleven states in 1957 and 1958. This chart also shows a substantially higher accident involvement rate for older drivers—though their rates never equal the rates for drivers under 21. Sections of highway with posted speed limits were generally avoided so that traffic would have maximum opportunity to travel at speeds of choice.

Chart 14 is based on BPR-determined driving speeds. It is interesting to note that the dashed curve representing the age group over 64 is positioned rather favorably among the curves for the five age groups. Note also that for the "over 64" age group (as with the others) involvement in accidents is much more frequent at low speeds on "main" rural roads than at higher speeds. This is different from what most of us would have believed.

Older drivers were adjudged to be at fault considerably more frequently than those in the middle years, among drivers involved in accidents, in a study in Massachusetts and Connecticut, as shown in Chart 15. While often fault, or the relative degree of fault, is difficult to appraise, it seems reasonable to assume that the proportion of errors in judgment would not operate to the detriment of older drivers. More studies on this matter are needed.

In summary, as to traffic accidents involving the aging, there is great need for more studies. Mileages driven should be ascertained, and comparisons between age groups should relate accidents to miles driven. It would also be desirable to take other factors into account, such as proportion of driving in daytime, proportion of driving in rural areas, proportion of driving in bad weather. Then if drivers, say aged 65 - 69, showed a favorable rate, it could be pointed out, as it should be, that their rate was, for example, based on mostly daytime urban driving in fair weather—and there would not be an unwarranted inducement to certain older drivers to drive wherever and whenever they choose, "because the record for their age group is so good."

We need to know a great deal more about the accidents of the 65 and over age group. What causative factors predominate? Where do they occur? When? Why? To what extent are drivers 65 and over at fault? What impairments were factors of importance? To what extent was lack of understanding of highway, car, and traffic changes involved? To what extent were attitudes involved—and what attitudes? Were fixed habits serious parts of the problem? To what extent was lack of adequate strength or lack of driving skill important? In how many cases was a too complex situation, or the need to take several actions in too quick succession of major importance?

Only when we have through research obtained answers to such questions, shall we be prepared to develop properly based, selective programs for aging drivers. We've got a long way to go—and especially with rapidly growing numbers of aging drivers, we should be giving the matter much more attention.

Changes with Aging

Not only must accidents of the aging be intensively studied, but also it is highly desirable that persons interested in the human engineering aspects of highway transportation have a broad understanding of aging, of changes which occur which may affect traffic performance, of desires and problems of the aging affecting driving.

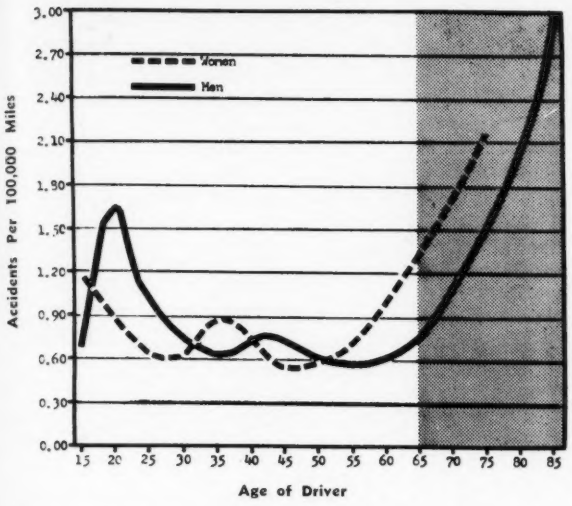
Attempting to get a bird's-eye view by conferences, correspondence and study of papers and reports, I was impressed with the many subjects which warrant attention. It also quickly became clear that aging was given relatively scant research attention until recent years. Now, however, aging is receiving much, and rapidly increasing, attention. A significant White House Conference on Aging is to take place January 9-12, 1961. Numerous valuable background papers have been released on many subject matter areas —*not, however, including transportation (or driving) as a separate subject.* Of course, the line had to be drawn somewhere, but considering its importance in our way of life, it seems a fair question if transportation might not well have been a specifically selected subject area.

I was impressed, too, with the numerous evidences of activity and leadership in the subject of aging by the U. S. Department of Health, Education, and Welfare—and particularly by the Public Health Service.

This paper is not the proper place for a comprehensive statement on aging or of changes with aging, even were I qualified to present such. It is, I think, appropriate to present the following annotated list of changes, with aging, which seemed to me to have relation to driving.

Chart 12

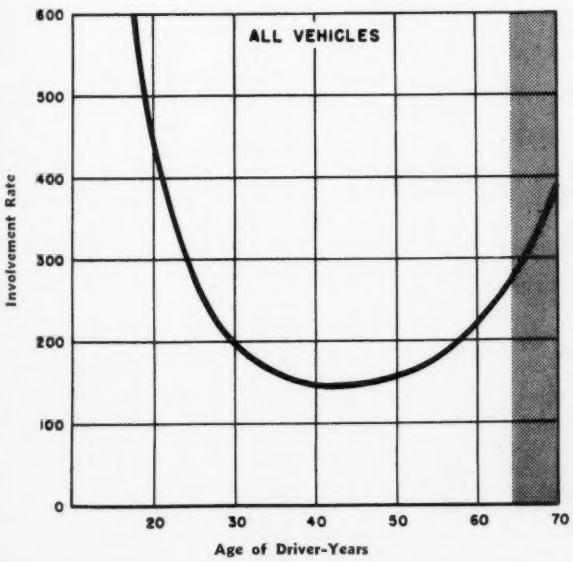
Accidents Per 100,000 Miles Driven by Age of Drivers.



Source: "Age and Sex in Relation to Accidents," A. R. Lauer, Highway Research Board Bulletin 60, 1952.

Chart 13

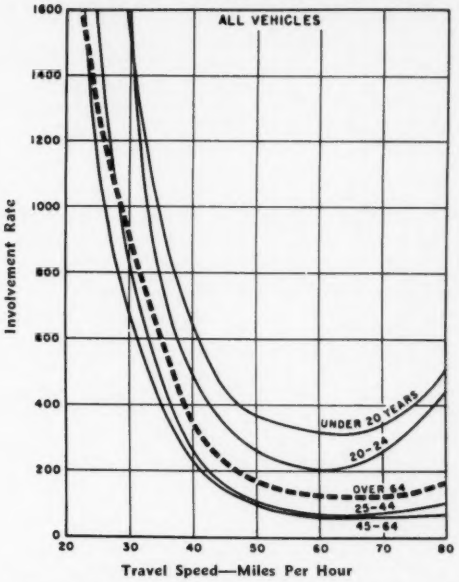
Rate of Involvement in Rural Highway Accidents By Age of Driver—Daytime



Source: "The Federal Role in Highway Safety," Bureau of Public Roads.

Chart 14

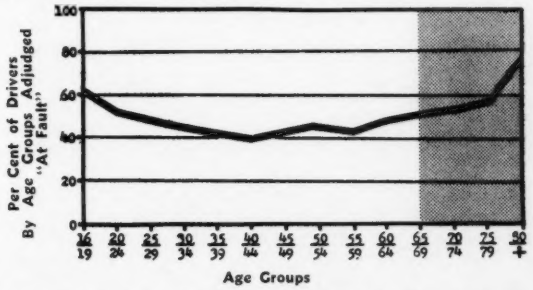
Rate of Involvement in Rural Highway Accidents By Travel Speed and Age of Driver—Daytime



Source: "The Federal Role in Highway Safety," Bureau of Public Roads.

Chart 15

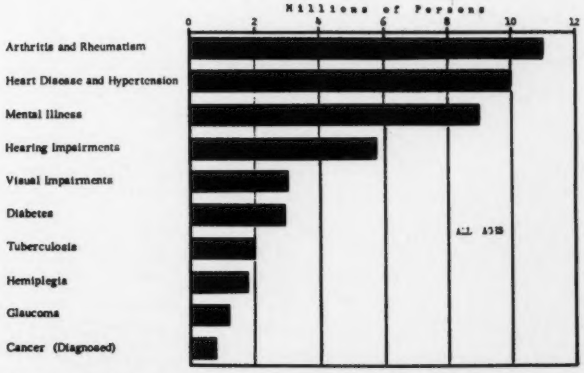
Percentage of Drivers "At Fault" in Accidents by Age Groups 1952



Source: "Handbook of Aging and the Individual," The University of Chicago Press, 1959.

Chart 16

Estimated Prevalence of Specified Chronic Diseases and Physical Impairments



Source: Chronic Disease Program, Public Health Service, Department of Health, Education and Welfare.

1. *Chronic diseases and physical impairments.* Chart 16 shows estimated prevalence of most common chronic diseases and physical impairments for the total population of the country. It is interesting to note that only one of the most common three chronic conditions—heart disease—is also one of the leading three causes of death among persons aged 65 and over. The other two at the top of the "killer" list are not at all common as *chronic* conditions—cerebral vascular disease and cancer (diagnosed).

Chart 17 shows growing percentages of persons having one or more chronic conditions as age increases. Note that almost four out of five persons 65 and over have some chronic condition.

Chart 18 shows that physical impairments also increase greatly among older persons. In the 65-74 year age group, nearly two out of five have some physical impairment. For persons 75 and over, it is nearly two out of three.

Comparison of chart 17 and 18 brings out a point which is important as to driving. Many more aging persons have some chronic condition than are impaired physically.

Moreover, "having an impairment does not necessarily indicate any interference with functioning. This is measured by the degree of limitation of activity." Table 3, p. 87 of Senate Report 1121, 86th Congress, 2nd Session, indicates that for the age group 65 and over, 36.8% have some activity limitation due to one or more chronic conditions—24.6% having partial limitation, and 12.2% having major limitation.

These data are in keeping with a finding of a survey by the National Opinion Research Center. About two-thirds of older people who had illnesses stated that these illnesses in no way interfered with their normal living—"they were neither kept in the house, restricted from climbing stairs, confined to a wheel chair, nor kept in bed."

As to driving, while some will be prevented by chronic conditions or serious impairments, it would appear that large numbers of the aging will, insofar as their physical condition is concerned, be able to continue to drive. In fact, in the entire discussion of impairments and driving competence it should be strongly emphasized that large proportions of persons aged 65 and over are competent drivers!

2. *Sensory changes.* "The general picture of the course of sensory changes with aging is one of decline. The reduction of efficiency found in sensory processes with aging reduces the quantity and quality of the information available to the organism. This reduces the ability of the individual to interact with his environment. Experience may compensate for the decrease in information input . . ." In driving, most important incoming information comes through two senses: vision and hearing—though touch is also often important, and smell sometimes is.

3. *Vision and hearing.* Among handicaps of the aging and aged, "hearing and vision handicaps are much the most numerous and show an abrupt rise in the later years, particularly at age 75 and above . . ." Chart 19 shows rates of physical impairments—visual and hearing—for various age groups. Note that in both bar diagrams the impairment ratio increases sharply, especially at age 65 and above.

As to driving, except for blindness, it should be pointed out that most of those indicated as having impairments either have such slight impairments that they can drive or can, with eyeglasses and hearing aids, be brought to sufficiently good vision and hearing to drive a car.

4. *Vision.* Various visual changes occur with advancing years. The lens of the eye becomes less elastic, which makes it harder to adapt when looking at objects at differing distances. Visual acuity declines and the field of vision seems to become narrower, especially when there is little light to see by.

Ability to judge certain colors and varying distances of objects (depth perception) appear to become less accurate. Ability to see satisfactorily when facing glaring light is seriously reduced, as is night vision when there is little light to see by.

Much more research is needed as to the effects of varying degrees of visual losses of these different kinds, on driving. Some seemingly have only relatively moderate adverse effects, provided the losses are not too great. Visual acuity appears to be one example—a person can drive safely even though visual acuity is considerably below the "20/20" normal.

Lateral field of vision (how far one can see to the sides when looking straight ahead) decreases rather steadily after about age 40, as is seen in chart 20. This chart is based on a study of 1279 persons, though numbers in the 60-64 and 65-69 age groups were limited (40 and 21 respectively). It should be noted that the decrease in visual field was only slight—the 65-69 group having 96% of the field which those aged 20-39 had. Other studies indicate that in older persons the visual field seems to decrease more rapidly with decreasing illumination.

Dr. Alfred Weiss somewhat questions studies of visual fields, but as to driving, it appears in any case that no serious deficiency occurs among most aging persons.

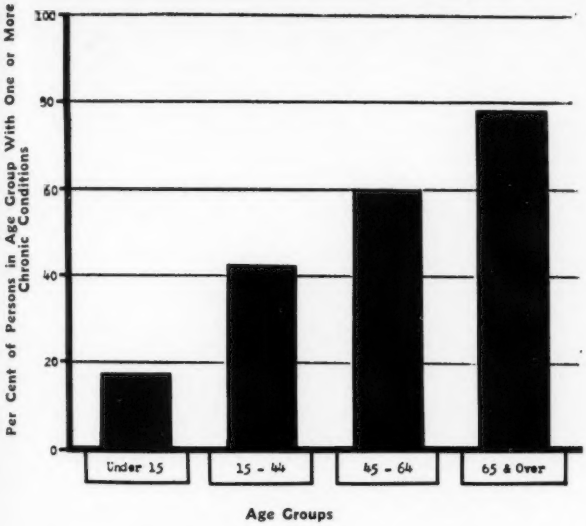
In contrast, deficiencies in night vision are serious in relation to driving. Many older drivers, of their own accord, avoid night driving. For many of these, it's a matter of being greatly bothered by glare. Goodly numbers, however, realize that they cannot see well enough at night. In terms of vehicle-miles, the traffic death rate at night is two and one-half times the daytime rate. A 1955 study by McFarland and Fisher indicated that "*for a light to be barely detected at threshold levels, each increase of 13 years in age requires a doubling of the intensity of the light.*" This finding seems to indicate that for aging and aged, where there is little light to see by—as for distant objects on an unlighted rural highway—much more light is necessary to detect objects. It also indicates an apparent undesirability of older persons driving at night behind a tinted windshield, since it would further reduce the amount of transmitted light.

Glare. Under low levels of illumination, average ability to see objects beside a glaring light diminishes sharply after about age 40, as is shown in chart 21. This chart is based on a 1938 study of over 3000 persons, by Earl Allgaier. The study also brought out the point which should be repeatedly mentioned, that there was considerable variation among individuals in any particular age group.

Another related study showed that, on the average, the amount of light necessary to make the test target just visible was about four times as great when glare was present as when it was absent.

Chart 17

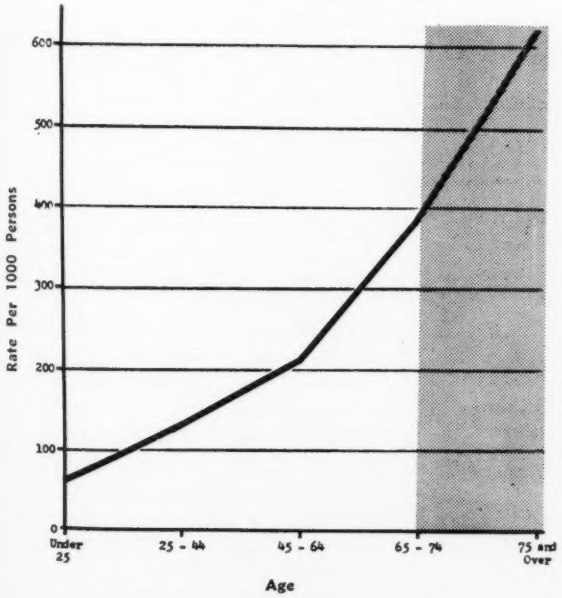
Proportion of Population with Chronic Conditions by Age Groups



Source: Chronic Disease Program, Public Health Service, Department of Health, Education and Welfare.

Chart 18

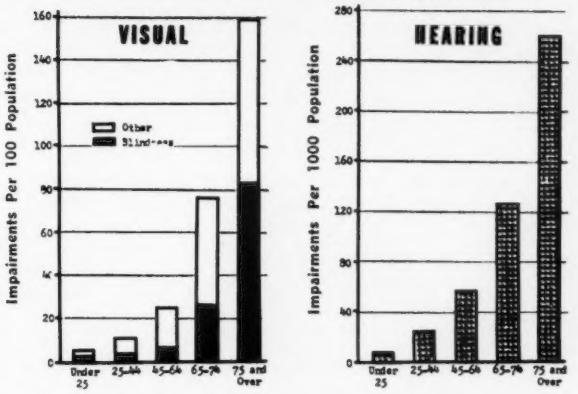
Physical Impairments By Age Groups 1957-1958



Source: Public Health Service, Department of Health, Education and Welfare.

Chart 19

Rates of Physical Impairments by Age Groups



Source: Public Health Service, Department of Health, Education, and Welfare.

Chart 20

Field of Vision as Related to Age

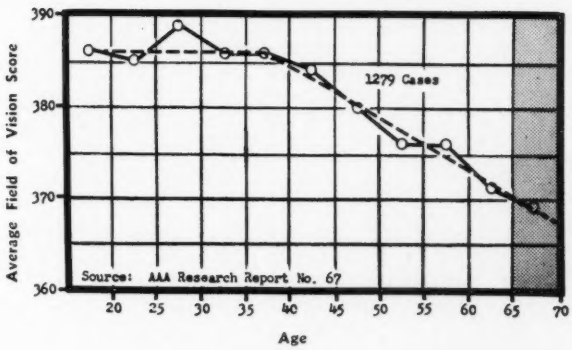
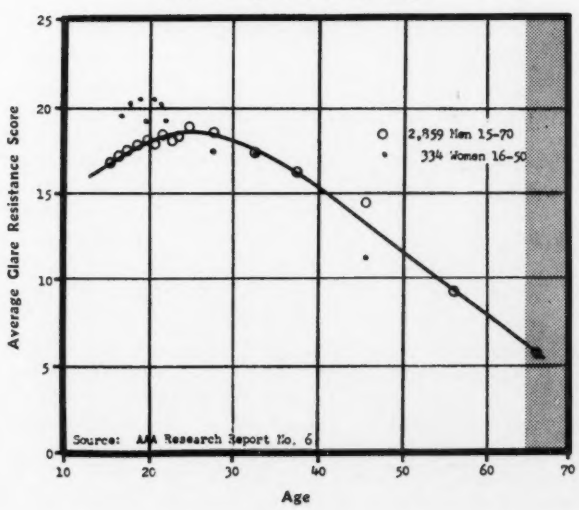


Chart 21

Effect of Age on Glare Resistance



Since night vision deficiencies are especially serious among aging drivers and since their numbers are destined to increase greatly, the need to improve night visibility greatly and to give further attention to reduction of glare are increasing challenges to engineers of various types — highway, automotive, traffic, lighting, as well as to other specialists dealing with vision.

Eyeglasses. Fortunately, correction of certain visual defects can be achieved by wearing proper eyeglasses. Other visual deficiencies are not aided by wearing glasses. Wearing suitable eyeglasses can correct or aid visual acuity, accommodation to objects at different distances, and astigmatism.

That older persons have greater vision problems of these kinds is clearly indicated by chart 22, which is based on a St. Louis, Missouri study of 133,342 applicants for driver licenses in 1942. Note that after age 40, the wearing of glasses increases very sharply to about age 65, at which age some two-thirds of applicants wore glasses. It is interesting that at all ages, more female applicants wore glasses than male applicants.

Recent information from the Bureau of Traffic Safety, Department of Revenue of Pennsylvania, is that of 397 persons aged 61 and above who have applied for a driving license since June 1, 1960, four out of five must wear eyeglasses. Note the difference—the St. Louis study is of persons who wear glasses when applying for a driving permit. The higher proportion in Pennsylvania is of persons who *must wear glasses,* though probably some of them were not wearing them when their visual acuity test was made.

5. *Hearing.* Chart 19 shows that one out of eight persons aged 65-74 and one out of four aged 75 and over, have some hearing impairment. Checking the booklet, "HEALTH STATISTICS —Impairments by type, sex, and age, United States, July, 1957-June, 1958," p. 2, it appears that the data in the chart are for any degree of hearing impairment. No information as to severity of impairment by age groups is submitted therein. Another table does show that for all ages combined, two per cent were totally deaf. It is well known that troublesome deafness increases sharply with aging.

"The deafness associated with increasing age is accounted for in great part by increasing inability to hear tones of high pitch" (mainly 2000 cycles and over). For low tones, there is very much less loss of hearing. Indeed a study of Kelley (1939) showed no significant loss for tones below 512 cycles from 60 to 86 years of age.

Correction or amelioration of hearing deficiencies can be obtained by use of a suitable hearing aid.

Provided that proper additional caution and increased visual alertness are used, hearing deficiencies need not impose too serious a handicap to driving.

6. *Perception and response.* "Older individuals are, in general, less able to discriminate or recognize ambiguous stimuli and concealed or masked figures . . ." "Slowness or difficulty in perceiving the stimulus is assumed to constitute a large portion of the increased response time that is observed with aging. Furthermore, speed of perception is considered an important feature of the thought processes or of mental activity, and thus this age change (i.e., slowness of response) is assigned a central rather than a peripheral localization." (Henry W. Braun.)

Applied to traffic, this seems to indicate that, for the aging, it is doubly important that stimuli (signs, markings, traffic signals, police hand signals, etc.) be simple and very clear.

7. *Psychomotor functions, performance and skills.* "In general, the old lose speed and flexibility and lack the kind of reserve and coordination that make for maximal performance. This is seen at the motor level . . ." ". . . most of the slowing of performance is in the pauses between successive acts, rather than in a slowing of the acts themselves. *At any age it takes twice as long to 'aim' an action as to perform it* (Singleton, 1955), *and this aiming takes progressively longer with age.*" (R. W. Gerard) (Italics added)

"A complete biological mechanism is capable of adapting itself to meet the probabilities of events—a form of experience—but by very reason of the fact that this makes for ease of maintaining performance, it also makes the organism less well equipped when the improbabilities occur." (Kay)

Another reference is to "firmer habits and greater rigidity of performance under familiar circumstances, just as the lack of reserve limits the innovation behavior available to meet new circumstances." (Gerard)

"In new situations the mechanisms concerned with organizing verbal and visual material operate less efficiently in the older person and require stronger 'signals' or more time to relate the new data to relevant material in past experience." "If older persons are allowed to deal leisurely with incoming problems, there is less likelihood of their becoming muddled." (Ross McFarland and Brian O'Doherty)

"Complex situations and conditions which emphasize speed are more likely to reveal deficiencies in the older person's performance. Qualitative changes in such higher mental functions as judgment, insight and comprehension tend to compensate for these measurable decrements. Performance depends on the ratio between such declines and compensations . . ."

Turning now to matters of direct application to driving, let us consider changes in reaction time and distance judgment.

Reaction Time. As charts 23 and 24 show, there is a lengthening of both simple and complex reaction time with increasing age. For simple reaction time, the increase is relatively slight, while for complex reaction time, it is quite substantial. This bears out the point made above as to complexity of task. Both tests simulated automobile driving. Stimuli were visual. The numbers of persons tested in both cases are significant—1422 for simple reaction time, and for complex reaction time, 810 women and 479 men. Notice the longer complex reaction times for women at all but one age group. This may have been affected by the greater driving experience of men.

A simple reaction time study by Dr. W. R. Miles showed that loss of speed in response was particularly marked after age 50. However, even between 50 and 95 years of age, age is an inaccurate index of speed of reaction. Dr. Miles found that while his 12 oldest subjects (average age 70 years) were relatively slow as a group, three of them had reaction times which were quicker than the mean for the entire group from 25 years of age onward.

Slowing of reaction time, states Dr. H. L. Reighard, has been attributed to slowness in perception of the stimulus. Such slowness begins in late middle life. If time available for receiving the stimulus is adequate, older persons generally perform more accurately, especially at tasks requiring a repetitive type of performance. Tasks requiring

Chart 22

Percentage of Drivers Wearing Glasses

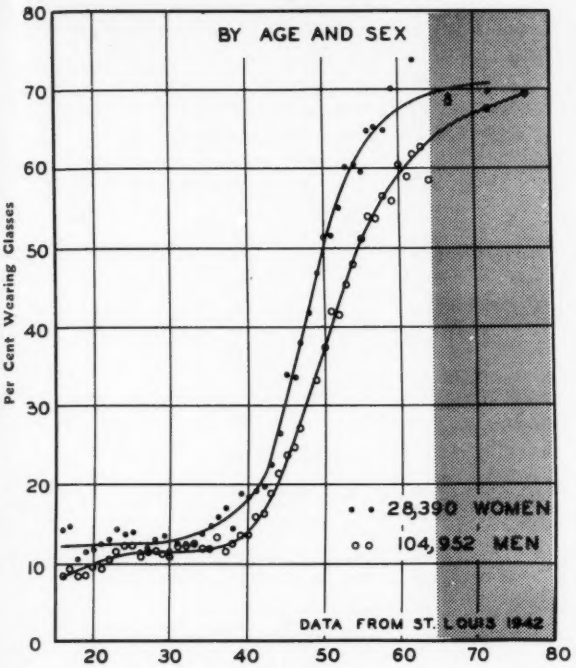


Chart 23

Relation of Age to Reaction Time

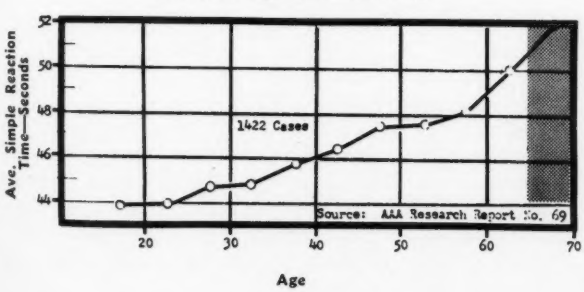


Chart 24

Relation of Age to Complex Reaction Time

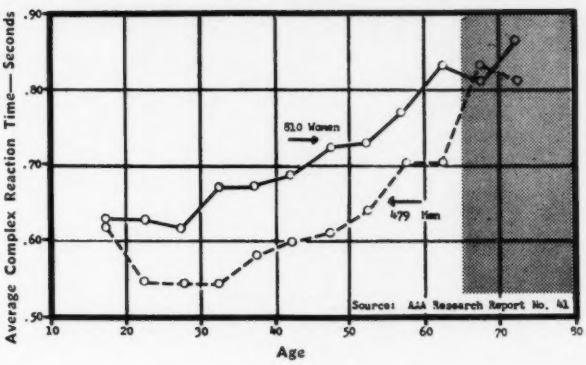


Chart 25

Relation of Age to Distance Judgement

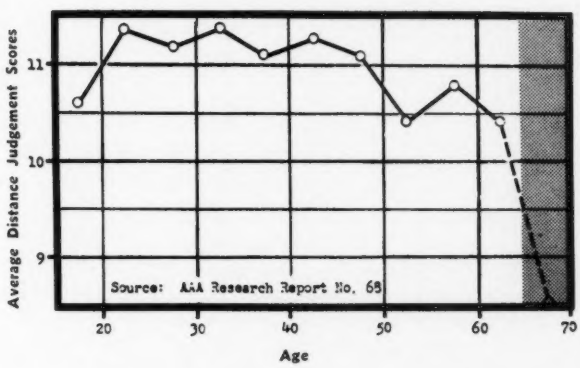
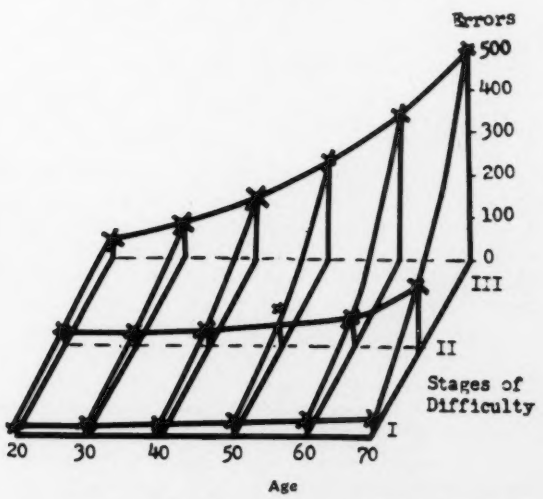


Chart 26

Relation of Errors, Degree of Difficulty, and Age



Source: "Handbook of Aging and the Individual," The University of Chicago Press, 1959.

continuous rapid action are not suitable for older persons.

Distance Judgment. Chart 25 indicates that ability to judge distance diminishes slightly with advancing years between 50 and 65. For age group 65-69, there appears a sharp loss in ability. However, since only 23 persons were in this age group, the rating should be considered as inadequately supported. The entire test involved 1431 persons. Their task was to indicate as between three miniature cars at an apparent distance (using a mirror) of 20 feet, which car was closest to them and which farthest away. Eight different car position settings were used.

The findings set forth apply to depth perception for nearby objects. While depth perception for distant objects is a different function, this finding suggests the importance of being sure that no-passing zones are long enough and that the beginning of each such zone is so identified by an adequate sized sign as well as by proper marking, that the approaching aging driver will know about the zone sufficiently in advance for safeguarding action.

Compensation for declining skill. McFarland makes the following significant point: "Driving an automobile is a good example of a complex skill that involves factors other than reaction time. Three of its essential elements are steering coordination, braking reaction time, and sensitivity to glare. After (age) 30 to 35 years, each of these shows a general decline in ability with age. It is noteworthy that the most complex skill, which requires a high degree of eye-hand coordination—steering coordination—declines more slowly than either glare vision or braking reaction time — showing that a decline in skill may be retarded by age-experience factors."

As to this point number 7, there seem to be many implications relating to the aging driver. Clearly the avoidance of complex or complicated traffic situations or traffic control devices, will have added significance as numbers of older drivers increase. Signals and signs should be legible and their message understandable at even greater distances than some have thought necessary in the past. Even greater attention should be devoted to avoiding surprise situations, and situations calling for quick decisions, and especially quick decisions in rapid sequence—as might, for example, be the case where urban interchanges are too close together. As with many other numbered points, the content of this number 7 emphasizes the urgent need for establishment of equitable criteria for determining when an aging driver is competent to continue to drive, and when he is not.

8. *Learning and other mental functions.* As to learning, it seems to be agreed that if they have adequate motivation, older persons are capable of learning, though it takes them longer. However, if the learning task involves a reversal of an established pattern or habit, or unlearning of previously learned material, older persons have much more difficulty. Older persons "are disproportionately handicapped when faced with novel or difficult material and by speeded or paced conditions. . . the observed decrement in motivation and drive with age is regarded as the cause of a real deterioration in the learning process per se." (Harry Kay)

"There appears to be a differential deterioration in mental ability with age." (Strother, Schaie and Horst). "It appears that the more dependent a mental function is on experience, judgment and reasoning, the more it resists deterioration with age." (C. Fox)

"The relation between speed and accuracy varies greatly according to the task and the difficulty level. . . . On simpler tasks in which the subject can choose his own tempo, older persons are sometimes reported as slower but more accurate than younger subjects." (Harold E. Jones) "The older group was at a relative disadvantage when little time was permitted for preparation." (Jack Botwinich)

A three-dimensional representation —see chart 26—is needed to show the relation between age, difficulty and errors. This chart is based on a problem-solving study by Harry Kay. For the simplest problem, at the front or bottom of the chart, there was only a very slight increase in errors with age. At the next stage of difficulty—in the middle of the chart—the increase in errors at the higher ages was substantial. But in the most difficult problem, there were large and steady increases in errors with advancing age. "Kay found that the results for the more difficult levels were partly determined by interfering factors from earlier procedures and by less flexibility in the adaptation of the older subjects." (Harold E. Jones)

Rigidity in mental set is also a factor which increases with advancing years. "Tasks which require a change in procedure or a substitution of new rules are particularly difficult at the later ages." (Jones)

What are some implications as to traffic and driving? Older drivers need to be brought up-to-date on traffic regulations, yield signs, lane signals, reversible traffic lanes, freeway driving, etc. Clearly special senior driver motivations must be found. Since some unlearning must take place and some involve certain complexities, *selective education* for senior drivers is called for, designed for their needs, including their slower speed of learning.

9. *Aging and life adjustment.* Older persons often develop deep anxieties as to slowing down and their recognition of decreasing capabilities, lest they become financial burdens on loved ones or over the financial burden which they are, anxiety concerning health, about becoming unduly restricted as to their movements and activities, general anxiety as to the future.

The aging encounter frustrations, as for example, in having nothing to do or in not being able to do things which they want to do. There are also various stresses such as result from emotional disturbances in the home or differences as to how this or that should be done.

Further complicating satisfactory life adjustment for the aging are certain changes which often come with advancing years. Thus, older adults often are more conservative, more rigid, or less resilient, more dogmatic and obstinate. They tend to be more biased. Their interests tend to become fewer—in part probably because their opportunities to follow up on their interests are more or less reduced.

McFarland states that the "weakest link in understanding the psychological aspects of aging is in the field of emotional adjustment." He points out that there is no "emotional quotient" to parallel the intelligence quotient.

McFarland also states that "older drivers appear to be under relatively greater stress in situations requiring rapid judgments or movements during limited time intervals as well as in driving at night . . ." The study involved was of truck and bus drivers.

Applications of material in this point number 9 to driving are important. As

long as an aging person is capable of driving, permitting him to do so can be one valuable way of helping to sustain his ego and to make possible interesting and useful activities, often including service of his fellow-man.

License renewal examiners should realize the tendency toward stress, anxiety, less flexibility, etc., and should carry out their tests in ways which are equitable and considerate to older folk.

The obstinate tendency of some to refuse to admit it when their driving skill has decreased suggests the desirability of developing on-the-road procedures in which, at the wheel beside a "scorer," the oldster would develop his own score as to capability.

10. *Compensatory changes.* Some changes which come as a person grows older have a potentially beneficial relationship to driving. They can indeed compensate at least in part for a certain degree of detrimental change.

Among changes potentially beneficial to driving are: increasing safety-mindedness, greater caution, added experience. Judgment is more mature. Reason prevails over impulsiveness. McFarland points out that judgment and reasoning are more resistant to deterioration with age.

However, H. L. Reighard points out that "the extent to which retained experience, judgment and reasoning abilities tend to counteract the functions which do deteriorate has not been adequately determined."

Special Reasons Why Aging Drivers Have Traffic Troubles

Aging drivers have traffic troubles for a wide variety of reasons—most of which are the same reasons which apply to drivers of other ages.

There are, however, some special reasons which either apply only to aging drivers or which apply more strongly to them. Let us briefly consider some of these.

Drivers aged 65 and over were all born before there were 16 motor vehicles registered in the entire United States. Those who obtained a driving license in their teens formed their driving habits and important traffic viewpoints while virtually all rural roads were narrow, two-lane, high-crowned, low-speed travel routes, carrying lots of horse-drawn vehicles. Motor vehicles were still few and far between. There was relatively little night driving.

Of course, most of those drivers have adjusted to changing traffic conditions. But not all have done a thorough job of keeping up-to-date with the many changes—in traffic laws; in highways with excellently paved multi-lane arteries, left-turn "slots" in islands, freeways with their sometimes not-so-simple interchanges; in traffic control features, such as lane-control signals, reversible lanes; in traffic patterns, including fast, multi-lane, capacity or near capacity, close-spaced movement; in traffic movements, including high-speed lane changing and "blending in" entry to freeway express lanes. Some older drivers do not seem to realize how greatly their obligations at the wheel have increased in recent years.

Many studies have pointed out the much greater difficulty which older persons, have in changing procedures, especially if the former procedure had become habitual. Their greater difficulty of making quick decisions, particularly under pressure, is also repeatedly emphasized.

Failure to yield right-of-way, states the National Safety Council, appears to be the leading contributory cause of accidents among older drivers.

Improper turning is a frequent cause of traffic trouble among aging drivers. Some probably fail to realize that in today's heavy traffic, turning must follow prescribed patterns and procedures. It is no longer all right to be careless as to turns. Other older drivers may have their minds on something else as they come to the turning maneuver.

Older drivers more frequently disregarded traffic signals, according to a California study. Inattentiveness, or absent-mindedness, was probably a major factor — since they tend to be more cautious and safety-minded than younger drivers.

Charles Henley, veteran AAA driving instructor in Washington, D. C., cited additional reasons why older drivers have traffic troubles. They are often impatient. Those who are licensed drivers but are having re-examination difficulties, think that they are good drivers—they've "driven for years without an accident." They do not need instruction (though either privately they've made up their minds to take driving instruction, or someone has persuaded them to do so). In their case, there is unwillingness to accept an impartial appraisal of unsatisfactory driving. It's interesting to note that by actual demonstrations and explanations in a dual control car, these oldsters generally become convinced.

When at the wheel, they are, for example, about to "slide through" a stop sign, the instructor brakes the car to a full stop with his dual control brake and often can show the oldster the hazard which a close-by oncoming car would have created. Mr. Henley explains how much heavier and faster today's traffic is and why they must now have time to look in both directions at the stop sign. After a bit, they are likely to say, "that's right; I just hadn't thought of it in that way."

Mr. Henley says that some tend to be stubborn. "Why, I was driving before you were born" is a frequent comment. Most of them can be "won over" nonetheless. Then they become very cooperative, but not always successful on retaining their license because, for example, of slow reaction times.

Some have troubles because of failing to realize or to admit their limitations and to make proper compensations for them.

Another reason for troubles which senior drivers have in traffic is their reduced ability to take correct action quickly and decisively.

Earlier we have mentioned other reasons for senior driver troubles in traffic; difficulties with headlight glare, night driving, reduced speed of perception, increased difficulty in complex situations and when under pressure, as when time to act is very limited, slower reaction times, reduced ability in distance judgment. Lack of adequate motivation to keep up-to-date on traffic changes is another cause of trouble among older drivers. Preoccupation with home and other adjustment problems while driving may well also result in traffic trouble.

As to accidents, Alan T. Welford states: ". . . accidents sustained by older people tend to be due to slowness in appreciating hazards or in taking action to avoid them . . ." A very near-accident involving my father, then over 80 years old, driving on Cape Cod, impressed both of these points indelibly on my mind.

Problems, Needs, and Desires of Aging Persons

"To know how to grow old is the master-work of wisdom, and one of the most difficult chapters in the great art of living." (Amiel)

Satisfactory adjustment to aging is,

for many, very difficult. A basic need of humans is to have a sense of personal significance, of personal justification, of being needed. Yet, a great many aging persons no longer have their regular job or the duty of caring for growing children. If living with their grown children, they often have little responsibility, or opportunity to be useful.

"Successful aging" (according to a "Background Paper on Research in Gerontology, Psychological and Social Sciences" for the White House Conference on Aging, January 9-12, 1961) involves two distinct phenomena:

1. ". . . The person's adjustment to the crises of life or such events as the accidents, serious illnesses, or deaths of friends or loved ones which occur more frequently in old age."

2. ". . . The adjustment of the person to the changes age produces within him and their effects on his relations to others. This is the adjustment to aging per se."

This paper has presented a number of the changes which come with advancing years. Obviously, they constitute or produce problems which are of concern to the aging. Adjusting suitably to them is clearly a great challenge.

Helpful as are the above two listed points in appreciating problems of the aging, they do not cover all problems. This is recognized in the above-cited Background Paper, which refers to "a group of problems somewhere between meeting crises and reacting to aging itself." These are related partly to survivorship and partly to the life style of the individual.

Thus, loneliness and isolation are serious problems for some aging persons.

Retirement itself involves a troublesome problem for many these days. Those retiring at 65 or over grew up and were surrounded until well into middle life "by a philosophy of work as the source of all benefits and a theory of aging as the period in which you retired only if you were unable to continue working."

It is with that background philosophy that many whose regular work days are over find themselves with a strange new problem to face—leisure and what to do with it. Moreover, unfortunately, in most cases, the individual has done little or no advance thinking and planning about what he will do as a retiree. Organized society has done too little to help him on this matter. Furthermore, many retired persons had developed only limited "outside" or avocational interests, or hobbies.

Many retired persons have difficulty in filling their leisure with satisfying activities — and many have feelings closely akin to guilt at not being at some regular work, because of earlier teachings.

Activities Desire. Background Papers for the White House Conference on Aging, January 9-12, 1961 make some important points:

"As with people of all ages, the aging want satisfying, worthwhile physical and mental activities, employment, voluntary service, or creative activities to develop and keep mental resources or to avoid or minimize mental deterioration and emotional disturbances."

"The elderly, including the retiree group, want to remain a part of the community and not become isolated from contacts with people of other ages." ". . . Some feel that retirement involves a more significant change in social relations than in activity patterns."

Other references point out that "activity is essential to successful living in old age," and that "use and activity are beneficial to the person. . . . Non-activity and non-use in the long run result in deterioration."

". . . Hobby activities decline consistently from late adolescence through middle adulthood. Only after age 50 do hobby activities seem to increase until a person reaches the early seventies." (Otto von Mering and Frederick L. Weniger)

Turning again to traffic and driving, we know that most aging drivers want to continue to drive. Since driving is often a key to interesting and purposeful activities of many kinds, this is an important reason why public policy should be to aid aging persons in continuing to drive so long as their driving competence remains adequate.

The preceding discussion of why aging drivers have traffic problems indicates many of their problems and needs as drivers.

Another problem of numerous aging drivers is their automobile insurance. A number of my aging friends have come to me seeking counsel on what to do because their agent or company has notified them that their policy will not be renewed. I wrote a number of prominent companies which write "automobile insurance," asking about their company policy regarding aging drivers. I asked if they had any available data which I might use, relating accidents to age of driver — and I pointed out the importance of mileages driven by people of various ages. None of the four which have kindly replied to date had such mileage-rated company information — though one furnished an appreciated tabulation by age groupings without any mileage factor. It is understandable why insurance companies are not so immediately concerned as to the mileage factor. Their tabulation showed a favorable insurance experience for drivers aged 65 and over. One mentioned that such a study is now being made, but that it will not be completed for some months. Three of the four continue existing coverage after age 65, subject only to physical or mental deterioration or to an unsatisfactory traffic or accident record.

As to accepting new business of persons 65 and over, company policies vary. Two do not accept such new business. One states that generally they believe such insureds should continue with their previous company, although they do make exceptions where there is reason for a change and where the individual has no impairment which would affect his driving ability. The fourth accepts persons not presently insured by them up to age 70, subject to approved standards.

One company stated that an affiliate "is writing a standard risk policy, which includes drivers 65 years of age and older among the eligible."

It would seem then that my friends who contacted me had some adverse developments on their records — or, perhaps their insurance companies had a different company policy regarding aging drivers.

Here is an area warranting further consideration. For, of course, all drivers of whatever age, should have and provide insurance protection.

Growing Interest in Aiding the Aging

Happily, there is now a lively and growing interest in helping the aging.

White House Conference on Aging. One good way to come to this realization is to examine the concept of and developments concerning the White House Conference on Aging, January 9-12, 1961. This, the first such White House Conference, was authorized by Act of Congress in 1958. Its primary

purpose: "to stimulate the further development of programs and services that will help to create an environment in which middle-aged and older people can realize their full potentialities as healthy and useful members of society."

Twenty subject matter areas were selected—unfortunately from our viewpoint, not including transportation.

The U. S. Department of Health, Education, and Welfare has a Special Staff on Aging. There is also a Federal Council on Aging, made up of the Secretaries of Agriculture, Commerce, Labor, Treasury, and Administrators of the Housing and Home Finance Agency and of Veterans Affairs. Secretary of Health, Education, and Welfare, Arthur S. Fleming, is Chairman. The Department of Health, Education, and Welfare, in cooperation with the Federal Council, is laying the foundation for the Conference on Aging, to be attended by 2800 delegates. A National Advisory Committee of 150 has been created, and it is organized into 20 Planning Committees for the 20 conference subjects. Technical Directors, assigned to each Planning Committee, provide professional staff service, with participation of 90 consultants selected from among outstanding experts. A Background Paper has been prepared covering each of the 20 selected subject areas. (Actually 19 prepared, since two subjects were combined in one paper.)

Fifty-three states and territories are actively participating in preparations. Fifty-two have received Federal grants for conference work, based on appropriations by Congress.

Active cooperation of many organizations is being obtained, to help assure maximum effectiveness of the Conference.

Growing literature. Another clear evidence of rapidly increasing interest in the aging is in the growth of significant literature on the subject.

The White House Conference on Aging Background Paper on Research in Gerontology (i.e. the scientific study of the phenomena of old age) provides interesting information. Shock Bibliography data indicate that in the six year period from 1949 to 1955, there were almost as many abstracts in gerontology as there were in the 48 years between 1900 and 1949. Shock also points out that in 1948, there were four journals in the world devoted to gerontology, whereas in 1957 there were 17. Shock's "Trends" (1957) also notes a shift from descriptive studies of age changes to experimentally designed studies that seek to answer more fundamental questions.

The writer has studied some twenty to thirty documents which seemed especially pertinent. One—an excellent, indeed, monumental reference book—is the 939 page "Handbook of Aging and the Individual," edited by James E. Birren and having 30 contributors. This deserves special mention because it was the most used document in preparation for this paper, and there are very many quotations from it.

Centers and clubs for the aging. The Background Paper on Free Time Activities for the White House Conference on Aging refers to the National Committee on Aging having recently sent 1,999 postcard questionnaires to agencies and special groups indicated as conducting either a center or club program for the aging. It received 1157 replies, reporting 218 centers and 803 clubs. A center was defined as a program open two or more days a week with full or part-time paid leadership. A club was defined as a group meeting less than two days per week with or without paid leadership. Sponsorship of centers was widely varying, and clubs have even broader sponsorship.

It is estimated that about 5 per cent of the aging are reached through centers and clubs, and that perhaps one-quarter to one-third could be reached "if it were possible to meet the full demand."

Other kinds of aid programs. The same Background Paper indicates that in addition to centers and clubs, "there is an increasing number of activities designed to stimulate public interest in the needs of the aging, to make the aging aware of the resources available to them, and to provide opportunities for in-service training and program improvements. These have taken the form of workshops, senior citizen days, weeks, or months; local, state, regional, and national conferences on the aging. Special motion pictures, television, and radio programs, feature stories in newspapers and magazines, are rapidly increasing in numbers. Special magazines are now published for senior citizens. Some of these activities are concerned only with free-time problems, others with the broad range of problems including free time."

State government activities. The same Background Paper also states: "State governments are concerning themselves more and more with the needs of their aging population. There are at present about 30 official or advisory state commissions or committees on aging. Their chief activities have been state-wide studies of the aging, state conferences, and stimulation of local action."

National organizations' programs. "Approximately 50 national organizations have developed specific programs (in the field of aging) and many more provide training and educational materials for their local and state affiliates; some of them foster educational programs through the mass media."

Change in societal concept. In connection with all such activities aiding the aging, it is reasonable to expect that there will come a much needed change in concept as to the aging.

Quoting again from Background Papers on Free Time Activity and on Research in Gerontology: "We have a stereotype of old age which is one of dependency, ill health, eccentricity and over-conservatism. . . . Unfortunately, older people too frequently accept the social judgment and resign themselves to inactivity, boredom and fruitless old age."

"Often the public image of an older person is one of a decrepit and ineffective person, whereas the correct picture, except at very advanced ages, is quite the reverse. . . . We know that the human being is a flexible, adjusting organism with many possibilities of compensating in his behavior for downward changes; that he can learn new techniques of meeting problems and that some of the changes can be compensated for by devices which restore normal efficiency. For example, he may wear glasses to correct his eyesight—or increase the illumination to better his vision."

Motivating older persons. In the growing activities to aid aging persons, numerous problems will be encountered. This is not the place for discussion of them. However, it does seem appropriate to mention one: A major problem which "centers" about "motivating older persons for learning."

Implications as to aging and driving. There is indeed a tremendous and growing interest in aiding the aging. Where are the street and highway traffic parallels to the growing evidences of activity on so many other fronts? Why aren't aging driver problems prominent among those being considered? What traffic-active organizations have given the matter warranted study, made plans, and gotten programs underway as to aging drivers (and pedestrians)?

The above discussion of this topic gives encouraging indications that there are and will be many already-developed "avenues" through which driver and traffic materials can reach the aging.

Some Driver Examination Activities Underway Relating to Aging Drivers

There are no doubt many activities going on relating to aging drivers. A few have come to the writer's attention, and deserve mention.

As has been stated above, it is deemed sound public policy that persons aged 65 and over be permitted and aided in continuing to drive so long as their driving competence is adequate. It is likewise sound public policy to eliminate as drivers those whose driving competence is inadequate.

But what is adequate competence for driving? Today there do not exist sound, research-proved standards for driving, let us say a private passenger automobile—much less a gigantic commercial vehicle combination.

Such standards are needed as a basis for original driver licensing and for use in re-examinations. Thus far, judgments have had to be based on experience and opinion.

The re-examination aspect is of greater significance as to aging drivers, though some aging persons are first-time applicants for a driving license. All states now have driving license laws which specify some number of years for which the license is valid. The great majority of states have either a 2 or 3-year renewal period, with 2-year being the much more frequent.

Hence, all state driver licensing authorities face the question of what the bases shall be for renewal of the license. The state motor vehicle administrator is generally given considerable authority on this matter in the state vehicle code and as to violation repeaters and other special problem cases. In recent years, increasing attention has been given in re-examinations to the aging driver.

U. S. Public Health Service-Sponsored Joint Conferences. Fortunately, the U. S. Public Health Service has sponsored two joint conferences, in collaboration with the American Association of Motor Vehicle Administrators, for state driver licensing administrators and chief state health officers, in 1958 and 1960. Many problems of joint interest have been discussed. Among these, one of the most important certainly is appropriate standards for driver licensing and for re-examinations. It is recognized that the driving task must be much more objectively set forth—for each class of vehicle. Much research is needed as a basis for specifying appropriate standards as to knowledge, skill, mental and physical ability, emotional conditions, attitudes, and practical driving competence. It is highly desirable that such standards have the support of motor vehicle administrators, state health officers, and the medical society.

As one result of these conferences, which are expected to continue, work is moving ahead on the long, hard task of developing such standards of driving competence. It is very much to the best interest of aging drivers that there be such a broad and comprehensive research-oriented approach to such standards. The very fact that such highly-sponsored work is in progress will discourage hastily opinion-based standards for driving competence from being given undue weight. Nonetheless, until motor vehicle administrators have such medical-authority-approved standards as a basis for their decisions, it must be expected that further steps relating to re-examinations will be taken—and these will almost certainly apply, among others, to aging drivers.

Some such measures have been taken and warrant mention.

District of Columbia re-examination program. Beginning in 1953, District driver licensing authorities started, at the already established 3-year renewal periods, to re-examine drivers aged 65 and over. At that time, there were tests of visual acuity, knowledge of rules of the road, and of traffic sign meanings. In February, 1953, a provision was added that if the renewal applicant was 70 years of age or older, he must, in addition to taking these tests, provide a report from a licensed physician which indicated that the applicant was, in the opinion of the physician, competent to drive.

Starting in 1955, every person aged 65 or over was also given a reaction time test—now a multiple-choice reaction time test. It was pointed out that, in a way, this also checks alertness, and sensory-motor coordination.

Beginning in July, 1957, any applicant aged 75 or over, in addition to the above requirements, had to pass an actual road test.

General reactions to this procedure have been good. Only a small minority complain—"why single us out?" being the most common query. Indeed, less than 50 a year carry their complaint as far as the "front office."

Some, on receiving the notice that they must take tests, decide not to renew. Of those just age 65, probably 90% take the test—and at least four out of five pass it. For the renewal nearest age 70, probably about 60% take the test, but not over two out of three pass. At and above age 75, not over two out of five pass. This is interesting information!

One 94-year-old driver, whose grandchildren had expressed concern about his continuing to drive, met all requirements "with flying colors." Afterward, he said he didn't know why he had been called in but he was grateful. He had been wanting to drive to California and now he was going right home and pack. Chronological age must not be regarded as a criterion as to driving competence!

In the District program, the form which the physician now fills out has a number of key questions on it—on such matters as blood pressure, strokes, dizziness. If the case seems questionable to the licensing authorities, the person must appear before a medical board (made up of volunteer physicians, arranged for through the D. C. Medical Society, and made up at each hearing of physician-specialists on matters then at issue).

Had such a program been in effect then, a wonderful uncle of mine, then in his seventies, might, with his fine wife, have lived for many years. He had told me of dizzy spells. I had strongly warned about his continuing to drive—but, without avail. A few months later, having I'm sure such a spell, he crashed into a tree and both his wife and he failed, after hospitalization, to survive.

In the actual operation of the District program, the licensing authorities

have found the reaction time test of very great help. About 25% of those disqualified fail on that test. They are entitled to three additional tries after an initial failure. The second can be taken in not less than three days. If there is again an inadequate rating, the next test cannot be taken in less than 14 days. The last re-test cannot be taken until one year has passed—and very few come back then.

The District program seems to be serving a very useful purpose, and, at the same time, to have and retain public support. Moreover, it seems equitable to the aging drivers involved!

Connecticut mobile health examination unit. Early in 1959, Connecticut Governor Abraham Ribicoff wrote U.S. Surgeon Leroy E. Burney indicating his concern at to a growing number of traffic accidents. He explained that the State Commissioners of Health and of Motor Vehicles were interested in developing a cooperative project wherein drivers involved in personal injury accidents, chronic violators, and those whose license had been suspended would be evaluated to see if physical handicap or disease might have contributed to their poor record.

Dr. Albert L. Chapman, Assistant Surgeon General and Chief of the Division of Special Health Services was designated to develop a program with the Connecticut authorities.

In August, 1959, it was decided in a meeting in Hartford that a mobile health examination unit should be developed. It would be the basis of a team screening examination. Results would be compiled, together with a record of the driver's accidents and other pertinent information. This phase would continue for 18-24 months. Following this, a research project would involve a continuing (longitudinal) study of these individuals and their histories for a 5-10 year period.

Estimated participants: 15,000-25,000 made up of (1) those having had license suspended; (2) violators building up to 7 points in the Connecticut point system; (3) drivers involved in personal injury accidents; (4) routine renewals; (5) volunteers.

Purposes of the mobile screening project:

1. To demonstrate the feasibility and utility of screening motor vehicle drivers for a variety of chronic and other conditions, utilizing a mobile unit.

2. To develop a research project which would attempt to relate findings (of the screening tests) with subsequent violation and/or accident experience.

This program is underway. No findings will be available for a minimum of five years—but then there may be findings of much importance and value to all, including aging drivers.

Pennsylvania's physical examination program. A bill to require physical examinations of potential and licensed drivers was introduced in the 1959 session of the legislature. It failed to pass.

In a 13 point traffic safety program, announced February 2, 1960, Governor David L. Lawrence included a physical examination plan. The program was put into effect by Executive Order. Physical examinations were instituted under Section 608g of the Pennsylvania motor vehicle code, giving the Secretary of Revenue discretion to require special examinations.

Over a year ago, through the Governor's Traffic Safety Council, the Pennsylvania Medical Society was requested to study licensing of motor vehicle operators. The study was made by various subcommittees. A report was produced setting forth proposed standards and guides to examining physicians. The report states that "because of the sparsity and unreliability of statistical data, the standards which follow are based on armchair analysis." It also states that since automobile transportation is such an economic factor, the emphasis is on re-instruction rather than revoking licenses.

Later in the report, the following is found: "In consideration of diseases, the important element is not the diagnostic label, but the degree to which any of them produce:

(1) Impairment of attention; (2) impairment of intellectual functioning; (3) impairment of perception; (4) impairment of reaction time; (5) impairment of coordination, to the point where the individual's capacity to drive is affected."

It is pointed out that personality factors in general are difficult to evaluate, and require the greatest amount of individual evaluation. Examples: antagonistic, rebellious of authority, emotionally unstable under stress, openly aggressive, with loss of judgment and of sense of caution. Experimental studies indicate a relationship between the way a person lives and the way he drives. A disregard for social values has been found frequently in people with high accident rates.

The program is now in effect. The physical examination phase as to applicants for a learner's permit went into effect June 1, 1960. A visual acuity test is made by state police. Upon successful completion, the applicant goes to a physician of his choice for the specified physical examination, and the physician submits his report to the licensing authority.

Already-licensed drivers will be examined on a staggered basis until all 5.2 million have been examined. It is anticipated that thereafter there will be re-examinations every 10 years to age 60, every 5 years thereafter.

During June and July, 32,511 applicants for learner's permits underwent the physical examination. Thirty-four were denied a learner's permit. One thousand, nine hundred and twenty-three, or 6% were referred by state police to their eye specialists.

It is too early to get a very significant reaction to the Pennsylvania plan, based on experience. Discussing the plan, an experienced national figure in the field of motor vehicle administration expressed doubt about the desirability of starting with such a wholesale coverage. He pointed out that 34 out of 32,511 applicants was a very small proportion. He indicated preference for starting on a much more selective basis as to physical examinations, especially since standards are as yet so poorly supported by research. He pointed out the importance of programs which will maintain public approval and support.

"Course" in Traffic Safety for Aging Drivers

As has been pointed out earlier, many aging drivers have not kept up with changes in traffic laws and in many other parts of the traffic picture. Clearly, they need education or re-education—and it should be highly selected—"tailored" to the needs of senior drivers.

Working in cooperation with Dr. Frederick C. Swartz, Chairman, Committee on Aging, American Medical Association, the Highway Traffic Safety Center of Michigan State University planned and conducted a "course" for Senior Drivers in November, 1959. The course consisted of four 2-hour sessions at Kellogg Center at the Uni-

versity. Behind-the-wheel driving tests were also offered to any in the group who wanted them.

The procedure followed was to ask cooperating physicians to secure the cooperation of 15 drivers aged 70 or over. (Actually they had 12, all of whom were over 68.)

A classroom curriculum was planned. Emphasis was placed on the personality of the driver, what makes him skillful or stupid, decisive or erratic, alert or dull. Time was arranged for use of the conference technique to discuss problems which they and their friends in the same age group meet as to driving.

Here are some of the matters discussed: dread of driving turnpikes or freeways in going to the city; a certain timidity as to driving even in one's neighborhood; dread of their insurance agent saying, "you're too old," or "you're too much of an accident risk." Aging drivers feel lost in a rushing, confusing, thoughtless world.

Here are some comments which aging drivers in the course made: "I feel nervous at the wheel. Other drivers on the highway get mad and blast their horns at me for no reason at all"; "My car is dependable, but I can't manage it in heavy traffic"; "My friends are critical of my driving"; "My son wants me to turn in my license. Guess I'll have to give up my neighborhood shopping, my church attendance, and my friendly visiting"; "It's really tough to become dependent. My younger friends just don't understand"; "Sometimes I wool-gather and miss my intersections"; I don't think a mature person intentionally disregards the law. He's more ignorant of the law and its protective function.

The course at Michigan State University was a valuable and very important practical trial and experiment. It seems reasonable to predict that very much more will be done in Senior Driver Education, or Re-education, in the near future.

Summary

Clearly, aging drivers are going to increase greatly in numbers. Much more attention and emphasis must be given to their numerous problems and special needs. Many studies and analyses must be made. A special Senior Driver Program—or better, a Senior Citizen Traffic Program—to include pedestrian aspects—is needed. The time for instituting ACTION is now.

Recommendations

A. Self-Help for Aging Drivers

A simple, self-help guide should be prepared and widely distributed to aging drivers, to help assure that they will keep out of trouble in traffic and will enjoy driving. Here are twelve points which might well be included:

1. Get your physician's advice concerning your driving. He may, for example, urge avoidance of heavy or fast traffic, or night driving.
2. Be sure your car is kept in tip-top condition as to its safety features.
3. Keep yourself in good condition. Drive only when you feel "up to it."
4. Keep on the alert. You do not want any careless or bad driver to cause you trouble.
5. Take it easy and enjoy your trips, short or long. On long trips, make frequent stops, *well off the roadway.*
6. Choose the less used, quieter routes.
7. Plan every trip, short or long, in advance. By so doing, you can usually avoid tension-producing heavy traffic, high speed routes, multi-lane arteries if you are uncomfortable on them. Be willing to go around congested areas or zones which bother you to drive in.
8. Keep windshield, headlight lenses, and eyeglass lenses spotlessly clean. Dirt on any of those interferes more than most people realize with effectively seeing, especially at night.
9. Set up a personal project of updating your traffic knowledge. You can get ready help from police, automobile club, traffic committee, safety council. Gather traffic and safety materials and study them—it's something to do which is interesting and valuable to you.
10. Join a driver improvement class if your town has such. If it doesn't, urge that one be set up.
11. Have a driving instructor check your driving and make suggestions. He can help you "polish up" your driving skill.
12. Take reaction time and other driver tests, as a means of finding out how you rate and what to do to offset any point on which your rating is not tops. Be sure to have your night vision and glare resistance tested.

B. Senior Citizen Traffic Study and Program

There should be promptly developed a Senior Citizen Traffic Study and Program—a major part of which would be devoted to Senior Drivers. This might well be co-sponsored by the U.S. Department of Health, Education, and Welfare and the President's Committee for Traffic Safety, with the active participation of national organizations active in traffic and safety.

Survey and Study. An early step should be an inter-disciplinary survey and study of the over-all subject, including major needs both present and future.

Research Needs. There should be developed a list of major research projects needed, with recommended priorities.

Program Development. Plans should be developed as to program, and where responsibilities therefor should rest. On this point, national organizations should be invited to indicate what activities they will undertake. A very important part of the program would, of course, be concerned with Public Information.

Organization. Consideration should be given as to what organizational measures are needed to advance the program expeditiously. Included should, of course, be plans for making optimum use of "going" organizations, including the many centers, clubs, etc., for the aging.

C. White House Conference on Aging

The White House Conference on Aging should include important consideration of transportation, with emphasis being given to Aging and Driving. It is realized that such a conference must draw the line somewhere as to coverage. However, transportation, and especially highway transportation, is so important in the American way of life that it seems reasonable to recommend that even at this late date, some means be devised to assure important attention to the subject in the conference program.

D. Obvious Needs

Recommendation B for a Senior Citizen Traffic Study and Program will, even if it is quickly agreed to, require considerable time to get into operation. In the meantime, there are certain specific activities which should be instituted. Included are:

1. *Study of Traffic Accidents of Aging Drivers.* It is recommended that steps be promptly taken to study and

analyze separately, traffic accidents involving aging drivers. Such studies might well be limited at the outset, if staff requirements make it necessary, to fatal and personal injury accidents. Studies in depth as to causative factors should be made. What proportions are night accidents? Was a complex situation or the need for a quick succession of non-customary actions involved? Was there any indication of physical impairment being significant? Lack of understanding? Wrong attitude? Fixed habit? Inattentiveness? Confusion? Stress? These are examples of kinds of information which are greatly needed.

2. *Vision of Aging Drivers.* There is urgent need for studies of vision of aging drivers, particularly their night vision. Considering other changes with aging, such as longer reaction times, slower perception and response, what minimum visual acuity is satisfactory for driving? The aging have increasing difficulty in discerning objects when there is little light to see by. What degree of deficiency can be safely tolerated as to night driving? How can capacity in performing this visual task be measured under usual driver examination conditions? What criteria should be established on this matter as to continuing night driving? Ability to see objects in the face of glaring light needs a similar approach. So, too, does glare recovery—that is, in terms of driving, how long after exposure to glare does it take for the eyes to readjust sufficiently so that objects can be seen ahead of the moving car, with lower beam pattern in use?

Since over half of all traffic fatalities occur in hours of darkness and since many aging drivers are known to have greatly increased difficulty with night vision, the urgency of night vision studies is obvious.

Another question: Should certain aging drivers be prohibited from driving in hours of darkness, while permitted to drive in daylight hours?

3. *Personal physician counsel.* Personal physicians of aging drivers should warn their patients if any prescribed drug or other medicine is likely to have any seriously detrimental effect on their driving. They should also keep their aging patients informed and advised as to any condition which is likely to affect their driving. Their physicians are persons whose counsel and recommendations many an aging patient is most likely to accept.

4. *Senior Citizen Traffic Courses.* Colleges, universities, public and private school systems, interested in making a practical contribution to traffic safety, should plan and conduct at reasonable intervals traffic and safety courses especially tailored for Senior Citizens. Plans for organizing, announcing, and administering such a course, course of study outline, teaching aids, etc., should be prepared as guides by collaborative work of appropriate national organizations.

5. *Driver Appraisal Clinics.* Whereever possible, clinics should be made available to aging drivers where they can, on a voluntary basis, get impartial appraisals of such factors relating to their driving as can reasonably be checked—such as vision, reaction time, knowledge of the more recent laws, understanding of newer signs, and other traffic control devices, capability on a road test. At the end of the voluntary check-up, the aging driver should be given a report and such counsel and recommendations as are appropriate.

6. *Public Information.* Essential to progress is much better public understanding of the situation as to aging drivers, their problems, needs, and what can be done about them. National organizations active in traffic and safety should develop and distribute suitable informational materials. On this matter, persons in the aging driver age group should be "brought into the act" in helping to assure that such materials will have optimum effectiveness.

E. Criteria as to Driver Competence.

Some criteria of driver competence are well established, such as understanding of the rules-of-the-road and of traffic sign and signal meanings. There are numerous other areas, however, concerning which present criteria are based on opinion and experience, and lack sound research backing. Hence, a major need is the development of scientific, research-based criteria as to acceptable competence for driving. Any special features which are warranted as to aging drivers should be specified. As a basis for such criteria, the elements of good driving must be identified.

This is a large task, but an essential one. Certain criteria will vary for different types of vehicles, and for differing classes or kinds of drivers. Such criteria should be the basis for qualifying for a driving license, and for re-examinations.

F. Driver Re-examinations for Aging Drivers

When scientific criteria as to the various aspects of driver competence are available, driver re-examinations can be soundly based. In the meantime, it is recommended that a step-by-step procedure be used, especially as to matters involving uncertainty, such as some aspects of physical examinations.

Even before well documented criteria are available, experienced physicians can identify certain conditions to inquire about and watch for in re-examination procedures.

The aging driver re-examination plan described above as used in the District of Columbia is a good example of one step-by-step procedure. The driver just turned 65 has fewer requirements to meet than the driver aged 70. Furthermore, if there is question as to some part of the private physician's report, the matter is reviewed by a medical board. Here again, no arbitrary decision—a step-by-step procedure.

As to instituting required physical examinations, there might be merit in first selecting a rather advanced age (70-75). Then, with experience and assured public approval, the age could be reduced if that were deemed desirable. It is the strictly personal viewpoint of the writer that a goal of 65 years is reasonable—that is, any applicant for license renewal 65 years old or older would submit a report from his physician as to physical and emotional competence for driving. How rapidly it is wise to reach that goal is a matter for judgment.

G. Self-Demonstration Device as to Driving Competence.

The day will come, and with the very active interest in driving simulators, it should not be long in coming, when an aging driver, unwilling to accept the "opinions" of others that he should no longer drive, will be able to check himself in a specially designed driving simulation device, and at the end of the test run, see impartial data or evidences that he either is or is not competent as a driver. This will be a valuable aid in dealing with a difficult problem.

For Seven Cents Trafficwise

By Paul L. Streb
Assistant State Traffic Engineer
State of Rhode Island*

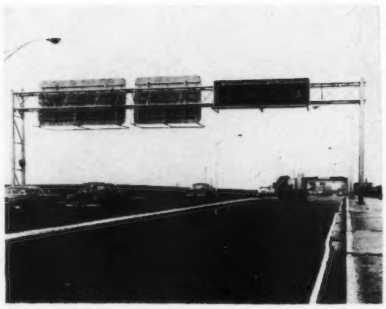
SEVEN CENTS of every urban Interstate construction dollar is spent on traffic control in Rhode Island. This includes traffic signs, striping and lighting.

Planning for Traffic Control Devices

Early in the planning stage a decision was made to locate all guide and destination signs overhead. Due to the constricted right-of-way featuring steep cuts, fills and many bridge structures, a very limited side of road area was available logically to place ground mounted signs. Also, continuous lighting was planned, causing lighting supports to restrict sight distance for most large shoulder-mounted signs.

A logical sequence of messages on guide signs is of paramount importance to the motorist when the Interstate and expressway systems are completed. Because of the relatively short sections of expressway that are constructed at any one time, a master plan of all necessary sign messages was super-imposed on the preliminary basic design of the entire Rhode Island Interstate and expressway system. This prevented illogical and repeated messages as each section is completed.

As the lengths of the sign messages determine the width of the sign panels, so does the height of the sign panel determine the overall height of the sign structure. In turn, the total sign area determines the structural design of the sign. Therefore, the correct messages and/or route numbers must be determined first. Because of the problems imposed, if future route shields are added to existing sign panels that feature only destination names, the necessary height has been included in most of these sign panels to allow for future route shields. Also, if two or more signs are mounted on an overhead structure, an attempt is made to "balance" the height of each sign so that they are all approximately the same height. When the above two procedures are done the initial messages are spaced uniformly on each sign panel. In all cases, the permanent sign panels are made with the proper messages as determined from the master plan. If temporary messages are necessary on signs they are placed on plywood sheets that completely cover the permanent sign faces to prevent fading of the permanent background.



Overhead signs and external luminaires on both sides of a truss structure where Interstate 195 meets an existing bridge. (Striping was incomplete and colored U. S. route shields were temporary when this photo was taken.)

From the U. S. Weather Bureau's map of wind speeds published by the Bureau of Public Roads, all signs were designed for 85 MPH wind speed.

Construction Detail

The Interstate standard alphabet using 16″ uppercase and 12″ lowercase letters, was used for most overhead destination names. Using these letter sizes and route shield placements, following Interstate standards, made these guide signs quite large in comparison to the type of signs we previously encountered.

After careful investigation, giving consideration to future maintenance, it was decided to use aluminum construction for all sign panels, supports and external lighting fixtures.

The aluminum truss type overhead spans offered the only practical method to mount the large overhead sign faces and had the additional advantage of providing an ideal support to fasten the brackets for the bottom mounted external lighting fixtures.

Sheet increment type panels were used for the signs. The backgrounds were completely reflectorized, and demountable type reflectorized letters, arrows and borders were used.

Two interesting innovations were used on the design of the sign faces. All the route shields were color coded. Rectangular state route shields have a white background with black letters and border. U. S. route shields are various colors, e.g., U. S. Route 44 has a blue background with white letters and shield outline; U. S. Route 6 has a yellow background with black letters and border, and U. S. 1-A has a red background with white letters and border. The reason this was done was that all U. S. routes in Rhode Island have been color coded in this manner for the past six years and to avoid confusion this same color code was incorporated on these signs.

This color coding was especially valuable on one two-mile section of Interstate 195 where there are five off-ramps for eastbound traffic and one off-ramp for westbound traffic. Meandering off and on these unbalanced ramps in this short section are six U. S. and state route numbers.

Another innovation was the use of reflectorized backgrounds on overhead signs even though the sign faces are externally illuminated. The decision to do this was based on the following facts:

1. Because of the complexity of the interchange designs it was exceedingly important to direct the motorists on this high-speed expressway system quickly

*Mr. Streb is now Traffic Engineer with the Port of New York Authority.

and safely, day or night. This is especially critical when visibility is low or power failures occur in this hurricane-prone state.

2. A painted background would present maintenance problems in the future.

3. Reflective sheeting costs about 20 cents per square foot more than porcelain enamel but this difference amounts to only 1% of the total cost of the average overhead sign installation including the structure.

4. External lighting was thought necessary due to the large amount of incidental street light and existing or potential illuminated advertising signs in the background.

Actually we are happy that these signs were completely reflectorized because one highway was open for six months before the contractor installed the external luminaires on the overhead signs. Also, several light failures have occurred in the short time since they were installed.

External Lighting

The exterior bottom-mounted lighting fixtures were of the aluminum "gutter pipe" type with a weatherproof plexiglas cover. Power groove fluorescent luminaires were used. The lighting fixtures were located out one-half the height of the sign panels and were fastened to the truss with 1" aluminum pipe. No attachment was made to the sign panels so as to prevent any distortion. Four-foot, six-foot and eight-foot fixtures were used. The dimensions of the fixtures and the lateral sign placement on the truss were carefully calculated because holes must be drilled in the truss members beforehand. Over these holes 1" threaded aluminum hubs were welded and the pipe brackets were screwed to these hubs.

Ballast for each fixture was mounted behind the sign panels. A photoelectric cell was mounted on the top of one of the tapered aluminum uprights. Electrical energy was furnished underground from the street lighting circuit and stepped down through a transformer containing a disconnect switch. All wiring was run through the inside of the truss members and aluminum brackets. From our experience this is a very satisfactory method of mounting external luminaires.

Twelve inches were allowed for the height of the fluorescent fixtures and brackets, even though the actual vertical height of the lighting assembly was only five inches. This gave emergency clearance in case the fixtures were accidentally bent down.

Foundations were designed to suit local soil conditions or were integrated with the existing and proposed bridge structures.

Placement

Of extreme importance in the locating of overhead sign structures is the necessity to make sure that the motorist does not need to look through a maze of street light poles to read the messages as he approaches the overhead signs. This is important when signs are mounted near the gores to off-ramps or on curved roadways.

Overhead signs should also be integrated with the street light placement so that the street lights are spaced equally ahead of and behind the overhead signs. Not only does this prevent interference with the street lights, but incidental light from street lights will not interfere with the photoelectric cell for the overhead sign.

Shoulder mounted directional signs will only be installed outside of the urban areas. Even though space may be available for side-of-the-road ground mounted signs in urban areas, overhead signs will be used exclusively for conformity of sign placement. Also, all non-interstate highways built to expressway standards in Rhode Island will use Interstate sign standards for uniformity.

Street Lighting

Another traffic engineering feature incorporated into the Interstate and expressway system was the use of continuous lighting on aluminum supports with self-contained photoelectric cells in the lighting fixture. On newer construction the lighting fixtures will contain both the photoelectric cells and the ballast within the luminaire.

Other Features

Permanent thermo-plastic type striping has been used on some of the completed sections of the Interstate and the results have been very satisfactory to date.

All traffic signals at ramp termini are the fully-actuated volume density type.

Temporary construction signs and barricades are predetermined and included as a separate item in the construction contract.

A large side-of-the-road advance directional sign. Visibility is not impaired since street lights are in the median.

Cost

Up to the present time in Rhode Island all traffic control work has been included in the general construction contract but thought has been given to placing it in a separate contract so as to lower the cost and avoid "red tape."

The bid items for traffic signs are broken down as follows:

Overhead signs are divided into two items. Overhead structures, including foundations, but not sign panels are listed individually and bid on a "per each" basis.

The sign panels including lighting fixtures, lettering and reflectorization are bid on a "unit price per square foot" basis for the sum total in square feet of all sign faces.

All other side-of-the-road signs are also bid on a unit price per square foot basis for the sum total. However, included in this price are the mountings which are detailed on the plans.

Street lighting and traffic signals are bid on a lump sum or unit price basis.

Pavement striping is placed on a unit price per foot of four- and six-inch wide lines.

Typical average prices we have received are as follows:

Overhead sign structures (50 to 80 feet long) including foundations $6,500.00.

(Continued on page 43)

A cantilever sign. Note the long span across six traffic lanes required if this design weren't used.

Design of Signal Systems By Graphical Solutions

By B. M. Davidson
Assistant Dean and Associate Professor,
Civil Engineering
University of Wisconsin

IT HAS BEEN IMPLIED that the graphical method for the design of a progressive lighting system is a "trial and error" process. It has occurred to the author that clarification of the graphical method is in order so that such statements can be properly discounted.

As a matter of fact, there is no "trial and error" process involved in the graphical method. If the individual understands the mechanics involved, rapid and complete solutions can be quickly reached and at the same time create a visual picture of traffic movement on the street being analyzed.

First, a master chart must be constructed.[1] It is recommended that a reproducible tracing be made so that actual investigations of streets can be made on copies of the original master chart. Since distance along the street is represented on the horizontal scale, select a suitable scale, generally 1″= 100′. The vertical scale represents velocity in miles per hour for various cycle lengths. It is easiest to use the sixty second cycle in order to plot the half-cycle lines and then, using appropriate ratios, add the other cycle times which might possibly be considered. Select the range of speeds which would be acceptable for the 60-second cycle remembering that lower cycle times will necessitate higher vehicle speeds to cover the same distance and longer cycle times will necessitate lower speeds. For example, a 20 MPH speed for a 60-second cycle would be equivalent in terms of linear distance traversed to a 24 MPH speed for a 50-second cycle, a 30 MPH speed for a 40-second cycle, or approximately 17 MPH for a 70-second cycle. In other words, all the above vehicles would travel the same linear distance within any given fractional part of or whole cycle. Table 1 shows the half-cycle relationship between the various cycle times and emphasizes that the distance traversed in each case is equal.

TABLE 1
SPEED VS. CYCLE TIME FOR FIXED DISTANCES

Cycle Time (sec)	Half-Cycle Time (sec)	Speed (mph)	Speed (ft/sec)	Distance (ft) (col. 2x4)
70	35	17.15	25.2	880
60	30	20.0	29.3	880
50	25	24.0	35.2	880
40	20	30.0	44.0	880

TABLE 2
DISTANCES FOR VARIOUS SPEEDS IN 60 SECOND CYCLE

Speed (mph)	¼ Cycle (15 sec)	½ Cycle (30 sec)	¾ Cycle (45 sec)	1 Cycle (60 sec)
10	220	440	660	880
15	330	660	990	1320
20	440	880	1320	1760
25	550	1100	1650	2200
30	660	1320	1980	2640

It should be noted that the ratio between the 70-second and the 60-second cycle speeds is 60/70 and the ratio between the 50-second and 60-second cycle speeds is 60/50. The shorter the cycle the higher the ratio and resulting speed.

Calculations for the distances which would be traversed at various speeds for the ¼, ½, ¾, and full cycle points of a 60-second cycle are shown in Table 2. Additional distances can be computed by addition of, or multiplication by, whole numbers to the figures given in Table 2.

From the above furnished data, a master chart can be drawn as shown in Figure 1. The zero reference line is called the First Half-Cycle Line. Half-cycle lines are sometimes used to determine the locations of signals but most frequently to identify which of the half-cycle lines each intersection will be associated with at a particular speed and cycle time.

The scale which determines the spacing between the vertical columns representing speeds for various cycle times may be selected at random but must be consistent once selected. In other words, the distance between the 60-second and 50-second cycle columns is the same as the distance between the 50-second and 40-second columns.

1 Traffic Engineering Handbook, (1950 edition), p. 235.

Should it be necessary to introduce a cycle time other than that originally plotted, it can be added graphically. For example, a 55-second cycle column would be located at the mid-point between the 60-second and 50-second cycle columns.

Secondly it is necessary to draw the street to be controlled to the *same* horizontal or linear scale as that used for the master chart. Those intersections at which traffic volumes require lights should be indicated as shown in Figure 2.

Each intersection will be associated or tied graphically to the closest half-cycle line. The quarter-cycle lines are therefore drawn in Figure 2 to indicate to which half-cycle line the intersections are tied at any given design speed. Note that in some cases the intersection will be ahead of the nearest half-cycle line. This is called a "lead." Conversely, a "lag" exists where the intersection is behind the nearest half-cycle line. Except when the half-cycle line intersects a vertical erected from the intersection point, each intersection is either a lag or a lead.

The ideal solution exists when lights are equidistant apart enabling a pattern of traffic flow to be established wherein traffic flowing in opposite directions is collected into queues and these queues meet each other only at intersections, thus releasing the remaining cycle time for use by the cross traffic at said intersections. This is referred to as the "alternate system." However, most lights are not equidistant apart; or if they are, they are too close together to enable traffic to flow smoothly except at extremely low speeds which the driver will not accept. Therefore, additional time has to be allocated to the flow on the design street in locations where *lags* or *leads* develop in order to allow traffic in both directions to flow uninterruptedly.

A quick solution can be achieved by drawing in lags and leads for each intersection as shown in Figure 2. Taking the lags only, the next step is to find the maximum lags for various speeds. In determining these, keep in mind that lags decrease at an increasing rate as one progresses to the right on the master chart. In Figure 2 the lag for the intersection at Henry Street is decreasing at a more rapid rate than at Bedford Street at speeds of approximately 23 mph in a 60-second cycle. This means that if the maximum lag is produced at an intersection at the left of the other intersections with lags, then it will continue to be a maximum lag with respect to all other lags as the speed is increased (moving vertically on the master chart) until another intersection in the system changes from a lead to a lag as shown in Figure 3 for speeds of 24 to 27 mph on the 60-second cycle.

When solving to determine maximum leads, the rate-of-increase increases as one progresses to the right on the master chart. Therefore, when a maxi-

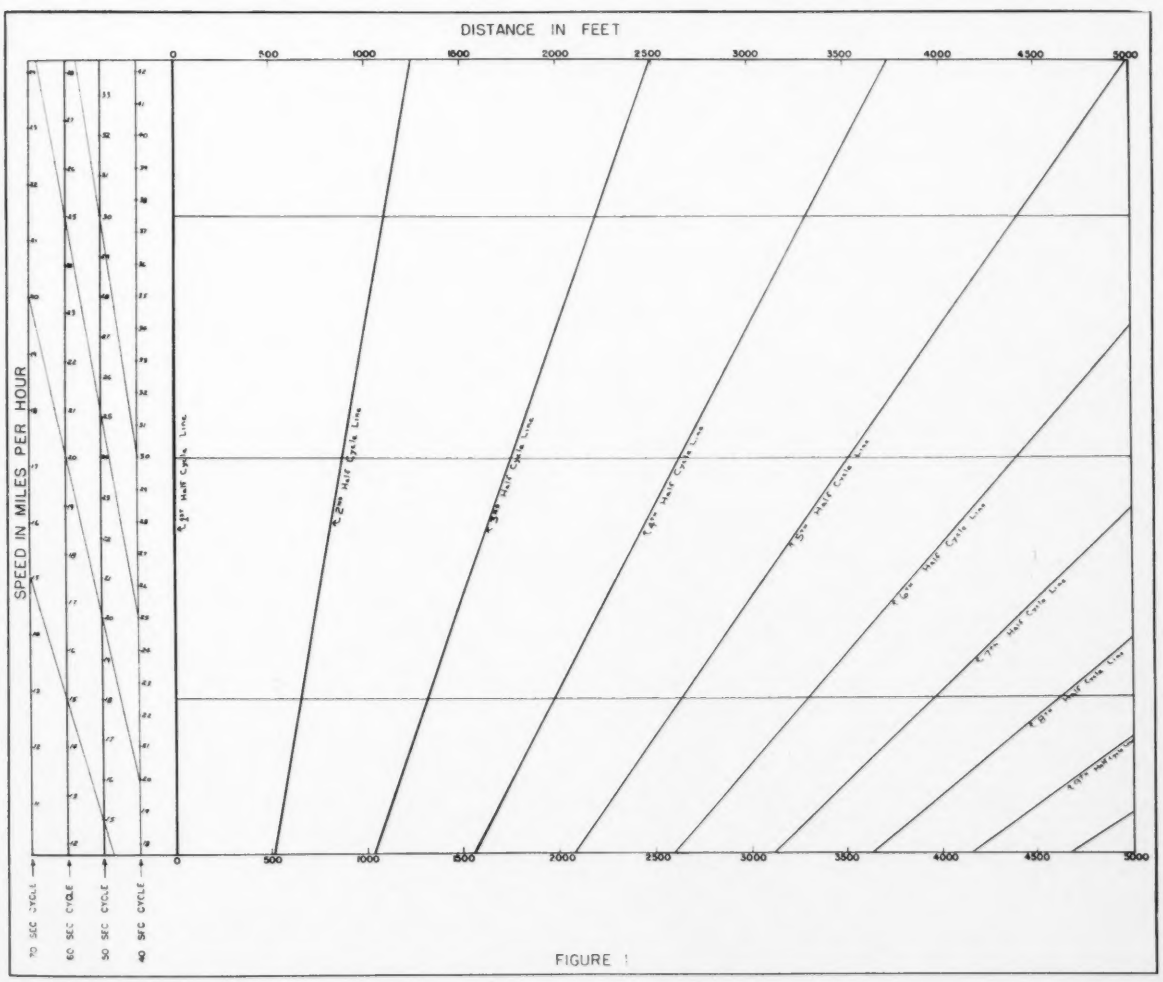


FIGURE 1

mum lead lies to the right of all other lead intersections, the maximum will remain at that intersection until the intersection in question becomes a lag. (For example note the 15 to 17 mph range for the 60-second cycle in Figure 3.)

The controlling elements, those of maximum lags and leads, should be indicated on the master chart as shown in Figure 3.

The optimum condition exists when the summation of the maximum lag and lead is a *minimum*. This is true because at these points the lights will most nearly approximate an alternate system which allows the maximum time for the side street traffic. Since the rate of change of either lag or lead increases the further to the right the intersection is on the master chart, it follows that if the maximum lead falls to the right of the maximum lag, the summation of the two is increasing as you move vertically on the master chart (see Figure 3). Therefore, a minimum condition arises at that point where the maximum lead changes from a point to the left of the maximum lag to a point to the right. This can also be caused when the maximum lag switches from a point to the right of the maximum lead to a point to the left as shown in Figure 3.

By noting these change points on the master chart plus the infrequent situation where there is a change from having only a maximum lag to having both a maximum lag and lead, the optimum solution points have been identified as indicated in Figure 3. Occasionally, at higher speeds where the maximum lag and lead are associated with the same half-cycle line, a minimum band is developed wherein any speed within the band satisfies the above criteria. Both the maximum and minimum points (the minimum points being the optimum solution points) have been indicated just to the right of the zero reference line in Figure 3.

The summation of the lag and lead times can be expressed as a per cent of the total cycle time and the relative efficiencies of the various optimum solutions compared. It is now up to the engineer to select the proper cycle time. He must decide on the basis of the amount of traffic that must clear the intersection per cycle rather than solely on the most efficient use of the signal time available. An average minimum headway of 2.5 seconds per vehicle up to a total of 9 vehicles is used to compute the signal time required. For each additional vehicle in excess of 9 a headway of 2.1 seconds should be used. Adjustments are made for left- and right-turn movements and 3 seconds of caution time are added to the total to permit the last vehicle to clear the intersection. From the above computations a proper cycle time is selected. Generally speaking, longer cycle times produce higher capacities and more efficient use of time but at the expense of longer delays. Secondly, he must select a speed which is reason-

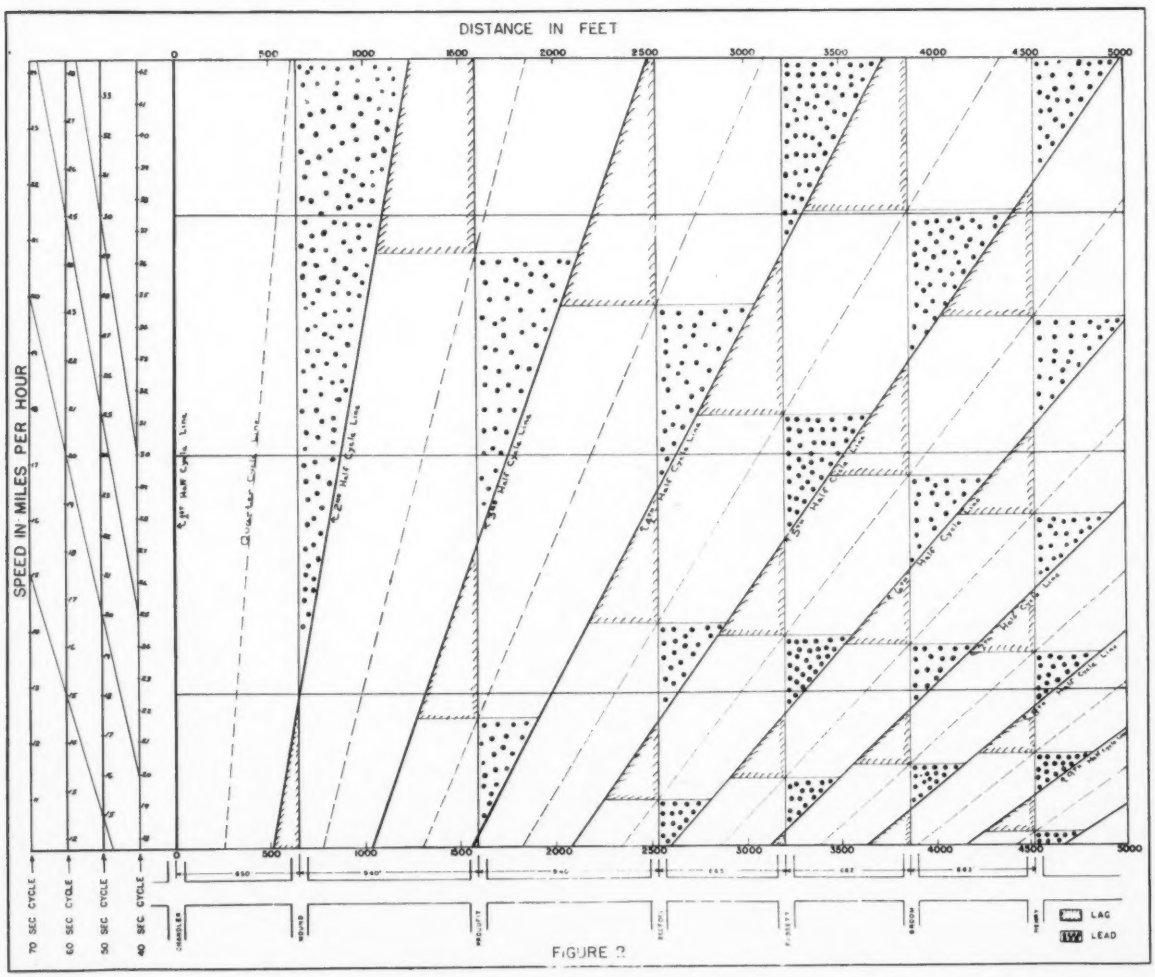


FIGURE 2

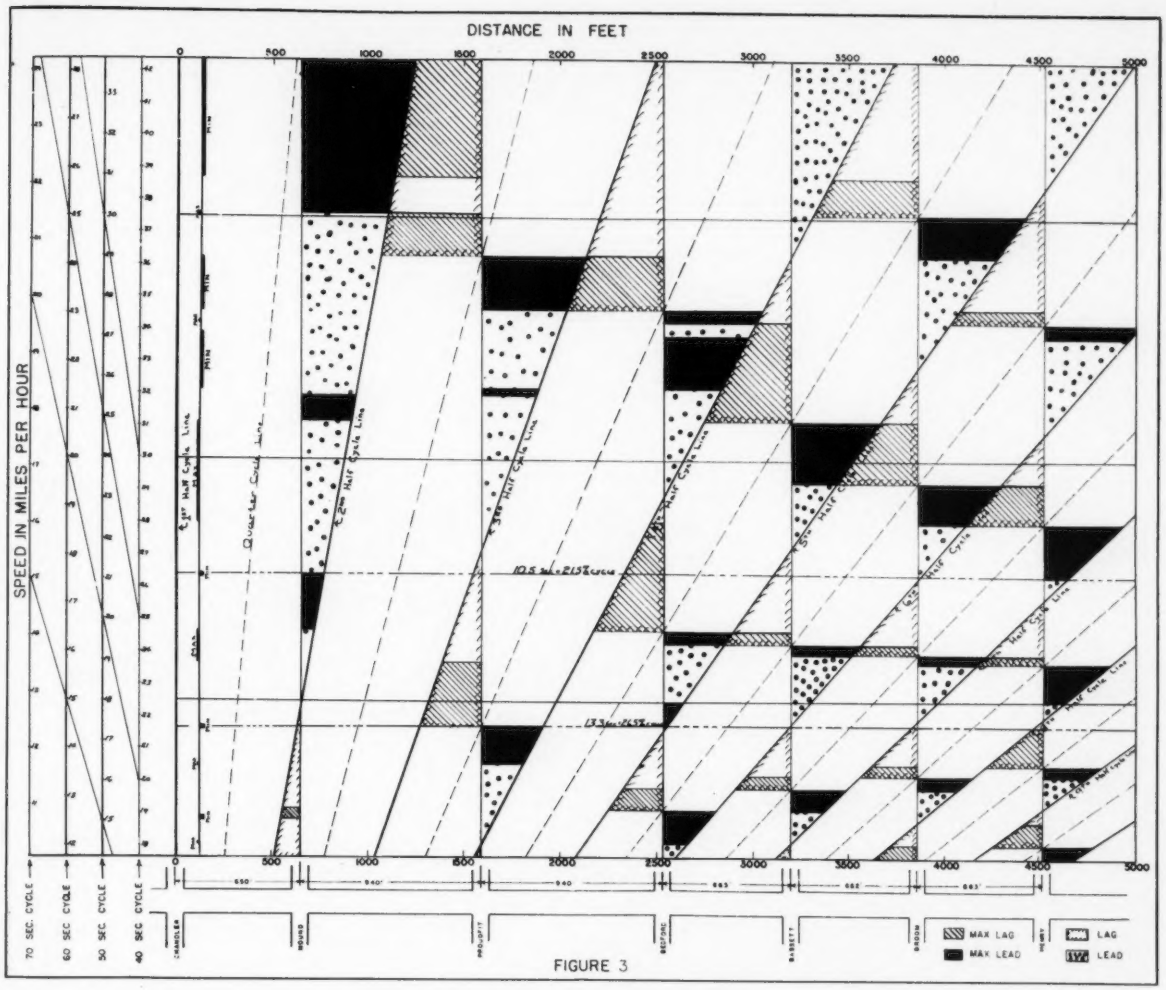


FIGURE 3

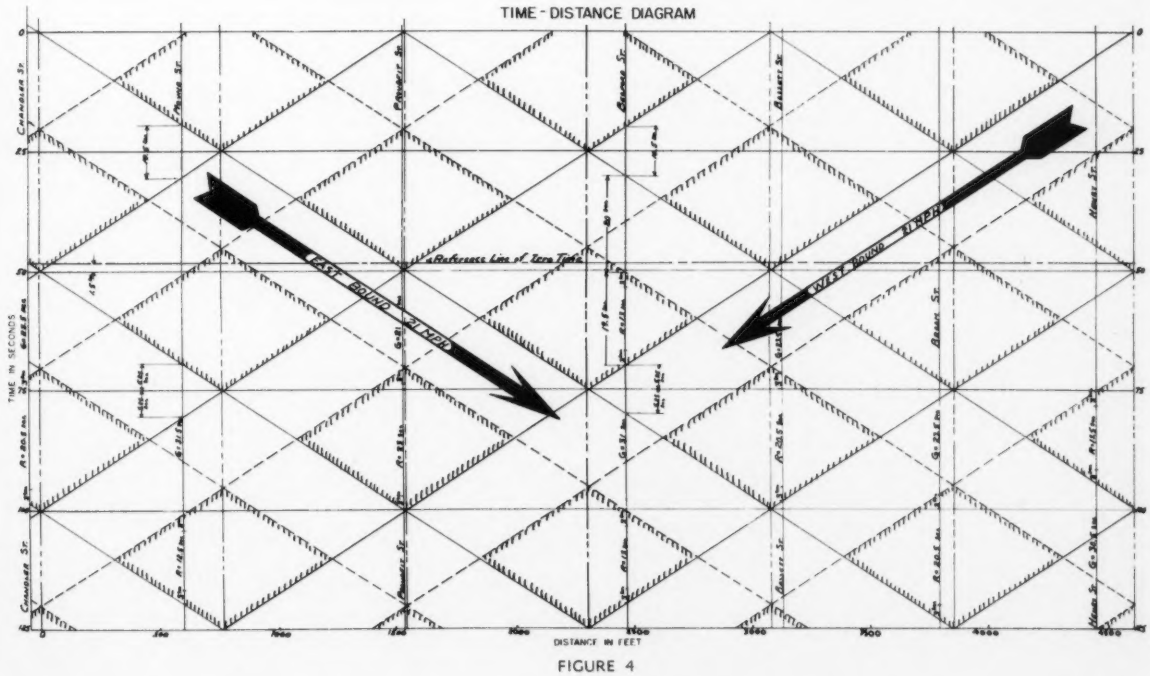
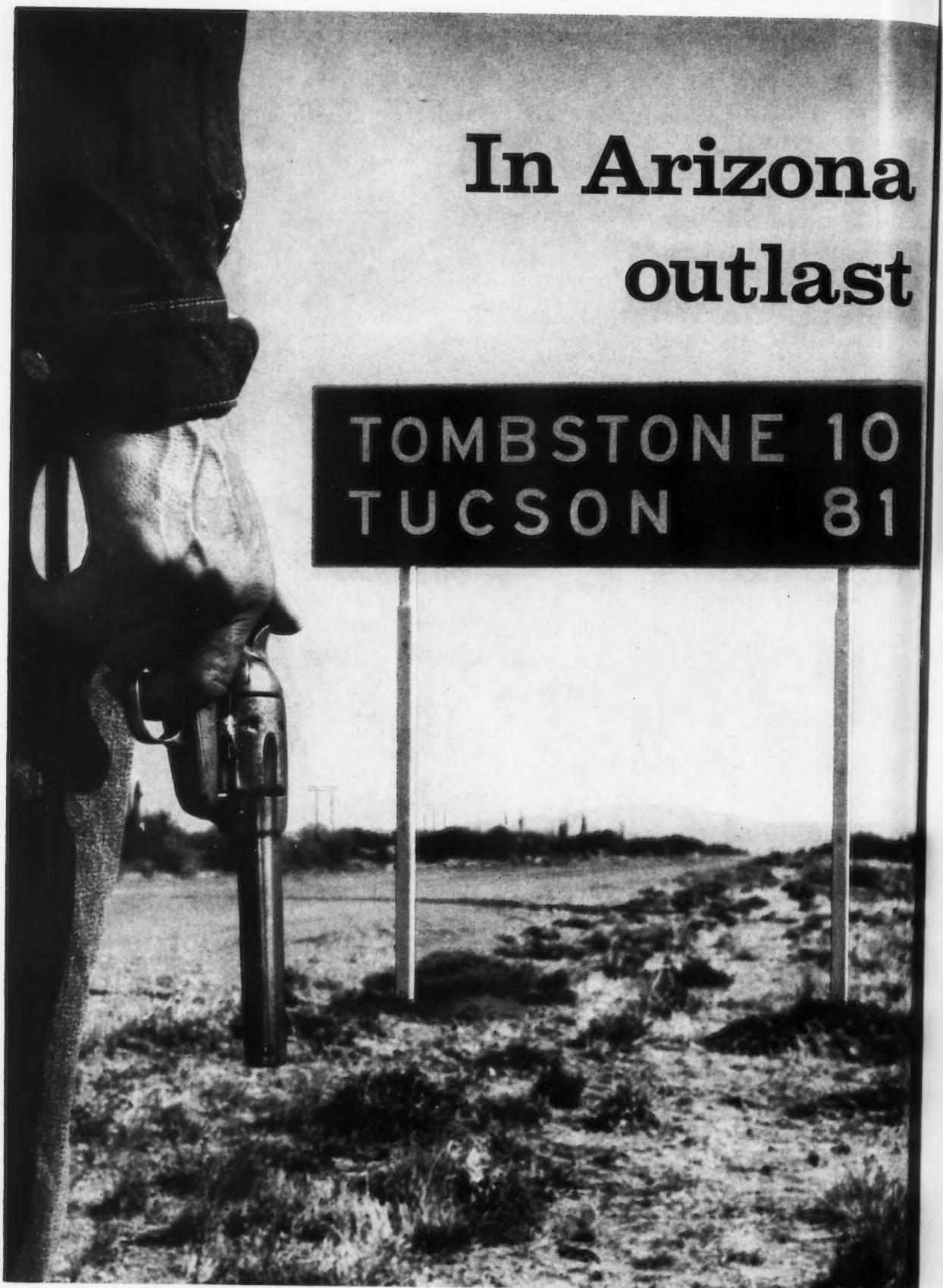


FIGURE 4


In Arizona
outlast
TOMBSTONE 10
TUCSON 81

overlaid plywood signs metal 3 to 1

SIGN REPLACEMENT WAS A REAL PROBLEM IN ARIZONA until the Highway Department switched to plywood. Trigger-happy motorists had been taking pot shots at metal signs. This led to rust, deterioration and often dangerously reduced legibility after only a few months of use. Then performance tests showed overlaid plywood's life expectancy was at least three times that of metal.

Now Arizona uses overlaid plywood for 85% of its signs. Vandals still shoot at them. But plywood stands up to both deliberate and accidental abuse without losing legibility. Bullets go right through without shattering the sign face. There's no corrosion problem; repairs are made quickly.

Overlaid plywood withstands Arizona's weather, too, with its extremes of heat, rain and snow. The plywood is completely waterproof, and the smooth, durable plastic-like surface makes an ideal base for reflectorized material.

Besides saving on maintenance and replacement, plywood signs are simple and inexpensive to fabricate. In Arizona's sign shop, a production-line process is used to make about 70 different basic signs, most with reflectorized legends.

FOR MORE INFORMATION (detailed specifications, application data, etc.) write:
DOUGLAS FIR PLYWOOD ASSOCIATION
TACOMA 2, WASHINGTON
—an industry-wide organization devoted to research, promotion and quality control
Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY

Plywood signs on Arizona's highways not only resist abuse from vandals and a rugged climate, but are attractive and easy to read. Fabrication in the state's sign shops is simplified because standard-sized panels of plywood are easy to store and easy to cut to required sizes and shapes. Above, reflectorized letters are applied to an overlaid plywood sign.

able for the driver to maintain. Excessive speeds increase the hazard as well as reduce the total traffic volume that can be accommodated.

The timing of the system can now be developed. The maximum lag and lead are balanced by shifting the street system forward a distance equal to $\frac{\text{Max Lag-Max Lead}}{2}$ if the resultant is positive, or backward if the resultant is negative. This equalizes the time available for cross traffic at the two intersections where the maximums occur. The time control diagram in Figure 4 is developed directly from the master chart and the no-flow diamonds are marked out. These are the times available for cross traffic.

In summary it is necessary to remember that the above procedure produces the optimum timing diagram when traffic volumes are equal in both directions on the design street and cross-traffic volumes are the same for all streets. Where the traffic volume varies directionally, timing can be established favoring the direction of heavier traffic. Where cross traffic volumes vary, the passing points should be established at, or close to, critical or high volume intersections so that the maximum time can be allocated to cross traffic at these points.

Coming Events

November 28-December 2—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS
Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Contact: AASHO, 917 National Press Bldg., Washington 4, D.C.

January 9-13, 1961 — HIGHWAY RESEARCH BOARD—
Annual Meeting, Sheraton-Park Hotel, Washington, D. C. Contact: HRB, 2101 Constitution Avenue, Washington 25, D.C.

March 5-7—SOUTHERN SAFETY CONFERENCE—
Annual Conference and Exposition, Atlanta Biltmore Hotel, Atlanta, Georgia. Contact: W. L. Groth, P. O. Box 8927, Richmond 25, Va.

March 6-24—TRAFFIC ENGINEERING SEMINAR—
Three-week course sponsored by Midwest Section, ITE and Northwestern University. Tuition $195. Contact: The Traffic Institute, 1804 Hinman Ave., Evanston, Ill.

AUGUST 21-26, 1961—WORLD TRAFFIC ENGINEERING CONFERENCE—
31st Annual Meeting, Institute of Traffic Engineers and 6th International Study Week in Traffic Engineering, Sheraton-Park Hotel, Washington, D. C. Contact: ITE, 2029 K St. N.W., Washington 6, D. C.

Traffic News

Marsh Honored By 1960 Matson Award

Burton W. Marsh was named winner of the 1960 Theodore M. Matson Memorial Award during the Annual Meeting of the Institute of Traffic Engineers in Chicago.

Burton W. Marsh

The Award, presented in memory of Theodore M. Matson by a group of friends and former associates, is given annually for outstanding contributions to the advancement of traffic engineering. Mr. Marsh is currently the director of Traffic Engineering and Safety for the American Automobile Association. He was a pioneer traffic engineer and was one of the founders of the Institute of Traffic Engineers, along with the late Mr. Matson.

The Award was announced at the opening session of the Institute's meeting on September 12 by Joseph E. Havenner, chairman of the Matson Fund Board of Award. Other members of the Board were: A. E. Johnson, Carl E. Fritts, Fred W. Hurd, Wilbur S. Smith and Edward H. Holmes. In accepting the Award, Mr. Marsh presented a paper, "Aging and Driving."

Previous winners of the Award include: O. K. Normann, U. S. Bureau of Public Roads; D. Grant Mickle, Automotive Safety Foundation; and Charles W. Prisk, U. S. Bureau of Public Roads.

The Board of Award presented a citation to Mr. Marsh at the time of announcement. The citation reads as follows:

Theodore M. Matson
Memorial Award Citation

For Outstanding Contribution to the Advancement of Traffic Engineering

BURTON W. MARSH

Burton W. Marsh exemplifies lifelong dedication to the traffic engineering profession, to the improvement of highway transportation, and to the development of the science and skills of accident prevention.

Burton W. Marsh is a pioneer. His appointment in 1924 as Traffic Engineer of Pittsburgh, Pennsylvania, heralded the recognition of professional traffic engineering. As traffic engineer of Pittsburgh, and later of Philadelphia, he pioneered the development of modern traffic engineering techniques. Since his appointment in 1933 as Director of Traffic Engineering and Safety for the American Automobile Association, he has pioneered and accelerated the development of the scientific study and treatment of pedestrian protection, the development of driver education and training, and the teaching of traffic accident prevention.

Burton Marsh is a seeker of truth. He has served as a member of the Executive Committee of the Highway Research Board since 1934 and is a Past Chairman. His contributions include leadership and stimulation of many research efforts, noteworthy among which are those in night visibility.

Burton Marsh is a champion of uniformity of traffic laws and devices. He is vice chairman of both the National Committee on Uniform Traffic Laws and Ordinances and the National Joint Committee on Uniform Traffic Control Devices.

Burton Marsh is a leader. He has been a constant source of inspiration to both students and practitioners of the traffic engineering profession. He was President of the Institute of Traffic Engineers from 1932 to 1934, and in 1955 he was named to its highest rank as an Honorary Member.

The Matson Memorial Award to Burton W. Marsh is a fitting recognition of a professional career in the distinguished tradition of his late friend and colleague, Theodore M. (Ted) Matson, by whose life traffic engineering was so profoundly influenced.

New HRB Committee to Publicize Findings

A new committee to better acquaint the public with important findings in highway research has been established by the Highway Research Board, National Academy of Sciences-National Research Council, Washington, D. C.

Pyke Johnson, chairman of the Board, has announced that John W. Gibbons, director of Public Relations for the Automotive Safety Foundation, will serve as chairman of the newly formed Committee on Public Dissemination of Research Findings. Major duty of the Committee will be to provide media of public information with major results of the research reports presented to the Board in all phases of highway transportation through a planned editorial program.

The Highway Research Board will issue nearly 100 publications this year, containing reports on several hundred research projects ranging from soil stabilization experiments to pioneering developments in electronic control of vehicles on expressways.

In announcing this additional Highway Research Board activity, Mr. Johnson said:

"A great many dedicated men in highway research are advancing the frontiers of knowledge in this field. In economics of highway transportation, in development of new equipment and materials for highway construction, in design of urban expressways with high capacity, in safety, in traffic control, and many, many other areas, they are producing more and more of the information this country needs in order to build better, safer highways. The responsibility of the Board is to provide a platform where those findings can be brought out of the laboratory and reported.

"The desire of the press, we know, is to take such findings another step—that is, to interpret their significance to the particular readership they represent. We hope that the new Committee on Public Dissemination of Research Findings can be helpful to them in this respect."

* * *

"Why is it that yesterday's self-made man can't get along without the help of his psychiatrist, a press agent, and three tax consultants?"

—Harold Coffin
in the Wall St. Journal

New Tunnel Speeds Pittsburgh Traffic

With the opening of the Fort Pitt Tunnel on September 1, it became possible for the first time for a motorist to drive through Pittsburgh, Pennsylvania, via the city's new four-lane expressway—without a traffic light or stop sign on the entire route.

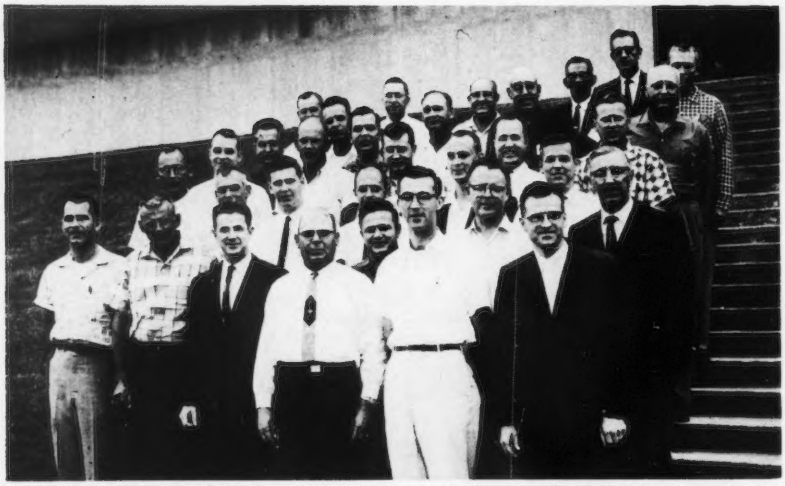
A time survey conducted by the Automobile Club of Pittsburgh several days before the opening of the Fort Pitt Tunnel—final link in the 20-mile Penn-Lincoln Parkway—disclosed that it takes motorists half as much time to drive through the city on the new expressway as on the old route.

The survey showed that, depending on the hour, it takes from 24 to 29 minutes to drive over the Parkway from the eastern terminus at Churchill Boro to the western terminus at Campbells Run Road, five miles from the Greater Pittsburgh Airport. Using the old Routes 22 and 30—over crowded city streets with 50 traffic lights and three stop signs—the distance of 20½ miles is virtually the same as on the Parkway, but the time required ranged from 46 to 63 minutes.

Time-saving features of the Parkway, according to traffic engineers, actually are far greater than the survey indicated. The Parkway, geared for high speed, can handle many more cars than the old route and now carries the largest portion of Pittsburgh's through traffic.

If the Parkway's current daily load, engineers point out, were routed over Routes 22 and 30, the time required to cover the 20½ miles would be far in excess of the 46 to 63 minutes disclosed in the Auto Club's time survey.

GATEWAY TO PITTSBURGH'S GOLDEN TRIANGLE: Aerial view shows route of Pittsburgh's new Fort Pitt Tunnel under Mount Washington several days before the 3600-foot-long, twin-tube structure was dedicated on September 1, 1960. Tunnel's southern portal (foreground) is located approximately one mile from city limits; northern portal leads onto recently-opened Fort Pitt Bridge over Monongahela River and provides direct access to Golden Triangle (background), Pittsburgh's main downtown area.



GA TECH SHORT COURSE—Pictured above are the participants and instructors in a recently conducted short course in traffic engineering at Georgia Tech. The course was sponsored by the Southern Section of the Institute of Traffic Engineers and the Department of Civil Engineering. Course supervisor was Professor Donald O. Covault. The course included classroom work on speed, volume, accident, and parking studies; highway and intersection capacity; traffic signs and markings; traffic signals; intersection channelization and other subjects. The participants to the short course represented seven states and twenty-two cities.

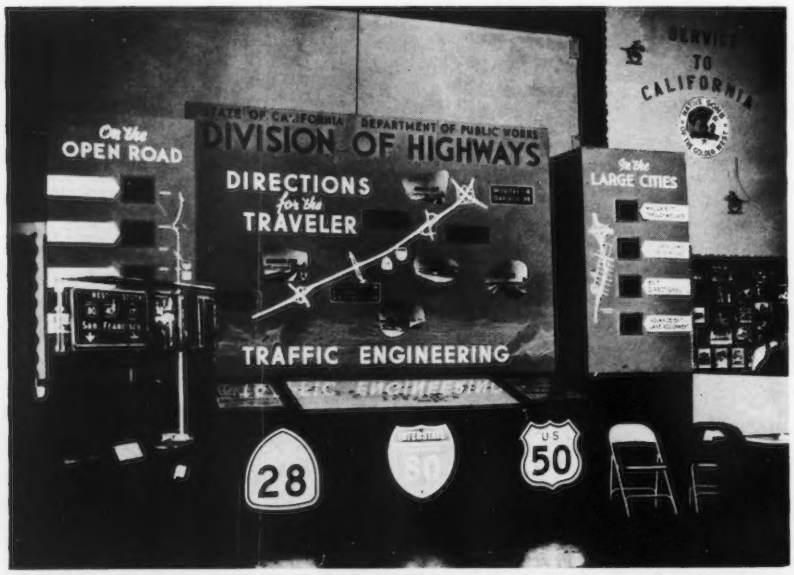
First TE Course Given in South Africa

South Africa's first formal course in traffic engineering was given this summer by Dr. Donald Berry, of the civil engineering department of Northwestern University.

Running through mid-August, the six-week course was attended by 36 men at Witwatersrand University, Johannesburg. Attending were representatives of the nation's cities, schools and consulting firms. A novel and encouraging aspect of the course—it is entirely supported locally, without U.S. aid.

Sponsored by the South Africa Road Federation, the summer school included 15 hours weekly of lecture, six hours of laboratory work, discussion sessions and talks by local specialists. Topics included traffic characteristics, traffic engineering operations, statistics, geometric design and urban transportation planning.

Assisting Dr. Berry was Johannes F. Schwar, who during the school year is working on his doctorate at Northwestern while on leave from his post as traffic engineer in his native South Africa.



CALIFORNIA FEATURES SIGNING AT STATE EXHIBIT—At the California State Fair this year, an exhibit of the California Division of Highways featured the problem of giving directions to travelers. The attractive exhibit pictured above illustrated the State's practices in directional signing on freeways, both in urban and rural areas. The exhibit drew many visitors, and was a most effective public relations project.

Film Available on Digital Simulation

A new film called "Digital Simulation of Traffic" has been recently completed.

The film, produced as a public service by the Midwest Research Institute, is based on research carried on under a grant from the Bureau of Public Roads.

"Digital Simulation of Traffic" is a fifteen minute sound color film describing the use of digital simulation in the study of traffic flow. Through the use of a cathode ray tube attachment to the computer a visual display of the computer output was obtained and filmed. This output shows the duplication, by the computer, of actual vehicle-driver behavior in traffic.

Prints of the film are available from Dr. Aaron Glickstein, Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri.

48 IRF Students Enrolled in U.S. Colleges

Forty-eight highway engineering students from 38 countries have enrolled for post-graduate training under the 1960-61 fellowship and bursary program of the International Road Federation (IRF).

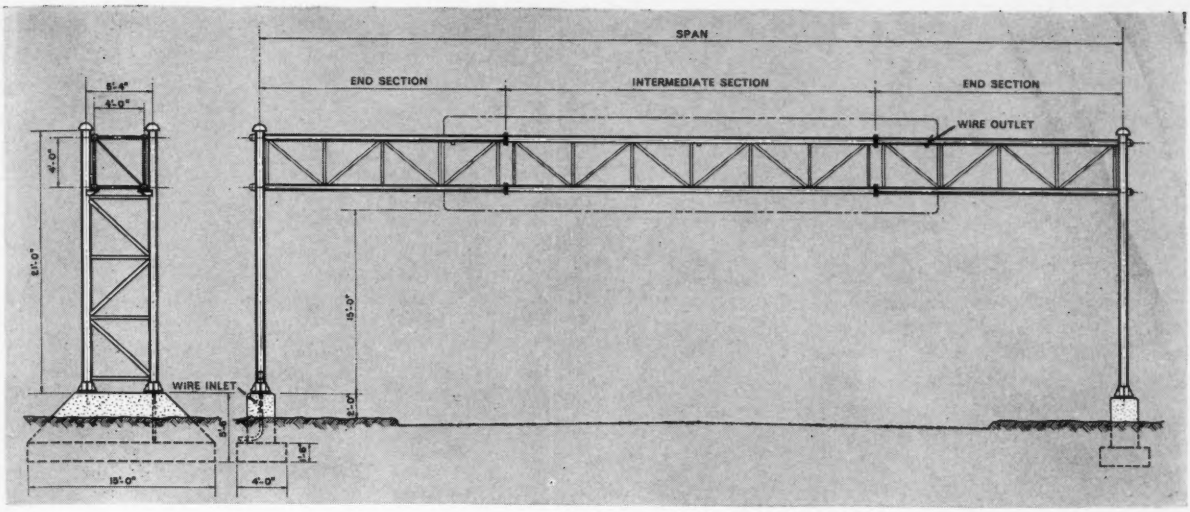
This is the largest delegation for a single school year since the IRF training program was inaugurated in 1949. Altogether, 264 engineers from 71 countries, including the current class, have participated in the program.

Forty-four of the 1960-61 fellowship students are enrolled in United States Universities (Ohio State, Yale, Northwestern and Purdue) and four are studying in Great Britain (Birmingham and Durham Universities).

After completing their academic year, the engineers will make an observation tour of highway installations and industrial facilities. Then they will return to their home countries, where their specialized knowledge will be applied in positions of responsibility and leadership.

Vietnam has the largest representation of students in this year's class—six. Nigeria, scheduled for independence October 1, has two engineers enrolled in the program.

The current crop of graduate engineers are from Argentina, Australia, Austria, Belgium, Brazil, Bolivia, Canada, Colombia, Costa Rica, Cuba, El Salvador, France, Ghana, Haiti, Hong



PLANET All-Aluminum Sign Support Structures Stretch Sign Budgets

Yes! You get more for your sign dollars with Planet all-aluminum sign structures because the first cost is your only cost. These structures are maintenance free—no painting is ever required and they never rust. And erection costs are low, too. Planet's lightweight, all-aluminum structures with cross-member design allow fast installation, a minimum of traffic interference.

Planet all-aluminum sign support structures are rugged. Even 120-foot spans with 500-square-foot signs will withstand 100-mile-per-hour winds.

Our standard box-truss type structures are designed to span 50 to 120 feet. Longer spans or sign areas larger than 500-square-feet are available by special design. For shorter spans specify our standard tri-truss structures. Write or call for complete information.

PLANET CORPORATION

1842 SUNSET AVENUE • LANSING, MICHIGAN

Engineered Handling Systems • Automation Equipment • Mill & Foundry Handling Equipment

Planet overhead sign support structures have been erected in Arkansas, Massachusetts, Iowa, Kentucky, Michigan, New Hampshire, and Ohio, and are under construction for others.

010

Kong, Iceland, India, Iran, Iraq, Italy, Jamaica, Japan, Korea, Lebanon, Malaya, Nigeria, Norway, The Philippines, Southern Rhodesia, Spain, Sudan, Surinam, Sweden, Thailand, Uganda, United Arab Republic, Venezuela and Vietnam.

Chemical Test Film Available

A new film on chemical tests for intoxication, "The Silent Witness," has been released. Made for the American Medical Association and the American Bar Association as a public service, the film is produced by and available from the Wm. S. Merrell Co., Cincinnati 15, Ohio, a well-known pharmaceutical house.

The film shows how tests are conducted and used in the prosecution of a drunken driver. It is available for showings to high school driver instructors, community service clubs, industry, PTA, and traffic safety groups, as well as to law enforcement organizations.

UCLA Traffic Engineering Course: Eighty-seven (87) students from five Western States enrolled in the course on Fundamentals of Traffic Engineering on the U.C.L.A. Campus, August 22-26, 1960. Instructors were ITE Members, Norman Kennedy, James H. Kell and Wolfgang Homburger of the Institute of Transportation and Traffic Engineering staff, University of California, Berkeley. This course is offered annually by I.T.T.E. with the location alternated between the U.C.L.A. and Berkeley Campuses. The Institute of Traffic Engineers, Western Section, was a cooperating agency.

ITE Traffic Engineering Awards Presented

Modesto, California—l. to r.: Douglas R. Carmody, Director of Parking and Traffic; Ross T. Shoaf, representing ITE; George Bowers, Chief of Police (partly hidden); and Don Hammond, Mayor of Modesto.

MV Registrations Up 3% in 1960

Motor-vehicle registrations are expected to reach 73,868,000 for 1960, a gain of 2,371,000 or 3.3 per cent over the 71,497,000 registered in 1959. The 1960 estimate, prepared by the Bureau of Public Roads, U. S. Department of Commerce, is based on reports of state registration agencies.

Passenger cars are expected to total 61,569,000 for 1960, a 3.4-per cent increase over 1959. Trucks and buses are expected to number 12,299,000, a gain of 3.0 per cent.

The 3.3-per cent rate of increase anticipated is less than in the previous year. Recent annual increases in total registrations, which reached a peak in 1955 when the automotive industry attained a record sales volume, have been as follows:

1954, 4.1 per cent; 1955. 7.2 per cent; 1956, 3.9 per cent; 1957, 3.0 per cent; 1958, 1.7 per cent; 1959, 4.3 per cent.

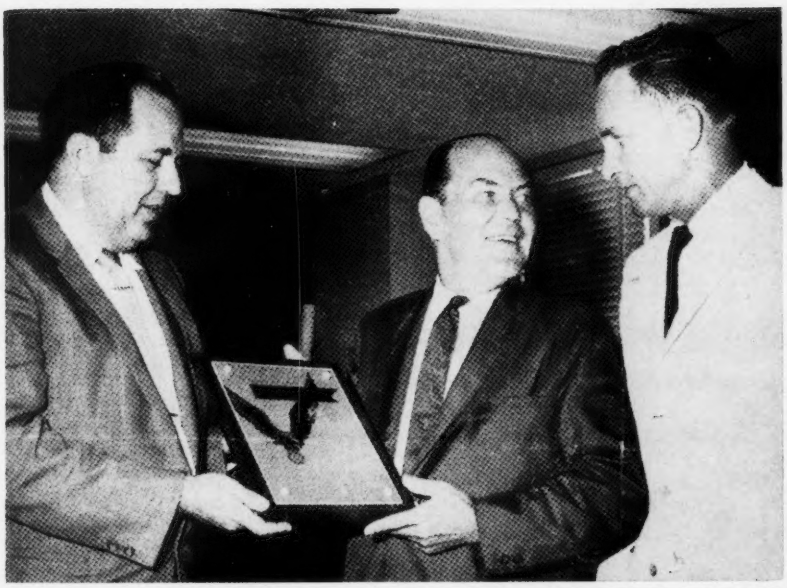
California leads the states in expected total 1960 registrations with 7.8 million, followed by New York with 5.1 million. Texas, Pennsylvania, and Ohio will each have over 4 million—Ohio for the first time; Illinois and Michigan will have over 3 million; New Jersey, Florida, and Indiana will have over 2 million—Indiana for the first time. These 10 states account for 54 per cent of the total registrations. An additional 17 states are expected to have over 1 million registrations each.

Arizona leads in anticipated increase in total registrations with 7.4 per cent, followed by Hawaii with 7.0 and Florida with 6.2 per cent. Eight other states have expected gains of 4 per cent or more. Only five states will have gains of less than 2 per cent.

ITTE to Hold Annual Conference

The Thirteenth California Street and Highway Conference, presented annually by the Institute of Transportation and Traffic Engineering, and University Extension, University of California, will be held on the University's Berkeley Campus, January 26-28, 1961. The Conference program will cover new developments in matters ranging from policy and planning to safety, traffic engineering, construction, and maintenance. Chairman will be John Moran, City Engineer of Oakland, California.

State of California—l. to r.: J. C. Womack, State Highway Engineer; Governor Edmund Brown; and Ross T. Shoaf, representing ITE.



Metropolitan Dade County, Florida—l. to r.: Edward A. Mueller, president, Florida Section, ITE; County Manager O. W. Campbell; and George H. Kunde, County Traffic Engineer.

SEVEN CENTS

(Continued from page 31)

Overhead sign panels including lighting, brackets, reflectorized letters, etc., $11.00 per square foot. If external lighting is not used deduct $2.00 per square foot.

Other side-of-the-road signs $10/- square foot including mounting supports.

Thermo-plastic markings per foot: 4″=20 cents: 6″=30 cents.

Table I shows the per cent of the total construction dollar spent for each traffic control item. These figures are an average for all of the Rhode Island urban Interstate type expressway contracts to date. To the highway user this 7 cents can be as important as the other 93.

TABLE I

Item	% of Total Construction Dollar
Overhead Signs	2.00%
Ground Mounted Signs	.38%
Street Lighting	4.27%
Permanent Payment Striping	.34%
*Construction Signs	— .15%
*Traffic Signals	— .65%
TOTAL	(6.99%=approx. 7%)

*Not included in total because of large variance in cost for each contract.

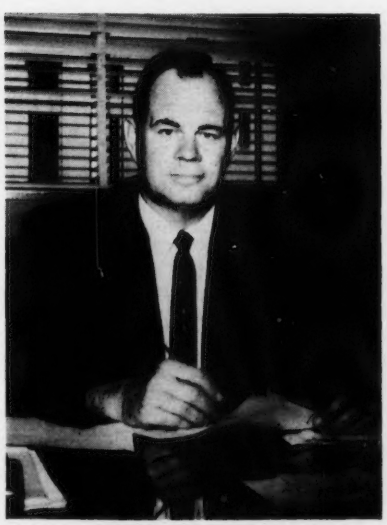
New Appointments

LA Department of Public Works Names Tillman Commissioner

Donald C. Tillman (Assoc. Mem., ITE) has been named Commissioner of the Board of Public Works of the City of Los Angeles. Tillman, who had been a senior civil engineer in a district office of the Bureau of Engineering, becomes the first working civil service engineer in the city's history to be promoted from the ranks to the post of Commissioner on the five-man Board of Public Works.

Tillman is a civil engineering graduate of the California Institute of Technology, and holds an M.S. degree from the same institution. He started work with the city in 1947, and rose to second in command of the West Valley district office. In his new position he will serve as liaison officer with the Bureau of Engineering and will also supervise bureaus concerned with right of way and land, and with communications. The Board of Public Works, which is the only full-time, salaried commission among the city's 25 boards and agencies, is mandated by the City Charter as the general manager of the Department of Public Works with its 13 variegated bureaus and expenditures of more than $100-million a year for public improvements.

In addition to his Institute membership, Commissioner Tillman is affiliated with ASCE and the American Public Works Association.



Donald C. Tillman

Conner Named Assistant TE in Ohio

Robert E. Conner (Asso. Mem. ITE) has been named as assistant traffic engineer of the Ohio Department of Highways, Bureau of Traffic.

Robert E. Conner

Before coming to Ohio for this new position in the Department of Highways, Conner was a traffic engineer with Tippetts-Abbett-McCarthy-Stratton, Engineers, New York, N. Y. He joined the consulting firm in 1952 following a tour of duty with the U. S. Army Corps of Engineers.

A civil engineering graduate of the University of New Hampshire in 1950, Conner completed the Yale Bureau course with the class of '51. He is a registered professional engineer in New York and Ohio.

Platt Joins Staff of D. C. Highway Dept.

Matthew Platt (Assoc. Mem., ITE) has been appointed Highway Research Engineer, Office of Planning and Programming, for the District of Columbia Department of Highways. In this position he will serve as head of the planning research section, responsible for basic research in the establishment of preliminary and long-range master plans for the development of future highway transportation systems in Washington, D. C.

Prior to assuming his new duties, Mr. Platt was traffic engineer for Michael Baker, Jr., consulting engineers in Rochester, Pennsylvania. A native of Fargo, North Dakota, he attended Cooper Union Institute, where he received the degree of Bachelor of Civil Engineering, and the Massachusetts Institute of Technology, where he received the degree of Master of City Planning.

Hubbard and Foxworth Join Wilbur Smith Staff

Robert A. Hubbard (Jun. Mem., ITE) and DeVere M. Foxworth (Jun. Mem., ITE) have recently joined the staff of Wilbur Smith and Associates. Hubbard will work out of the Richmond, Virginia office of the firm, and Foxworth the New Haven office. Currently Foxworth is attending the nine-month course at the Yale Bureau of Highway Traffic.

Hubbard, who completed the Yale program in 1955, has been Associate Traffic Engineer with the Virginia Department of Highways, in charge of the State Urban Traffic Engineering Section. A graduate of VMI, he has worked steadily for the Virginia Department since receiving his civil engineering degree, except for Army service and his time at Yale. In addition to his Institute membership, he is an Associate Member of ASCE and a member of VSPE and NSPE.

Foxworth, who received his engineering degree from Clemson College in 1957, worked briefly for the firm of Smith, Politte and Associates after college. In June of 1958 he became Transportation and Traffic Engineer for the Transportation and Research Command, U. S. Army, at Fort Eustis, Virginia. He is an Associate Member of ASCE.

Title Changes

Richard C. Brown, Jr.—is now Associate Traffic Engineer with the Virginia Department of Highways in Richmond; was District Traffic Engineer located in Culpeper, Virginia.

Leon Goodman—is now Transportation Planner with the Port of New York Authority in New York City; was Highway Project Planner.

Job Changes

Suat Basaran—formerly Design Engineer with the Paving Design Section of the Department of Public Works in Dallas, Texas; is now Highway Engineer with the D. C. Department of Highways & Traffic in Washington, D. C.

Robert W. Roseveare—formerly Research Assistant in the Civil Engineering Department of North Carolina State College in Raleigh, North Carolina; is now Traffic Engineer of DeKalb County in Decatur, Georgia.

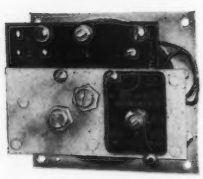
For Flashing Signals and Beacons

Specify The Flashers With Performance Proven Dependability

engineering and design features that have made Time-O-Matic the leading manufacturer of flashers since 1932

- open frame construction for efficient heat dissipation
- adjustable 50-60 flashes per minute
- not affected by extreme temperature variations
- slow speed induction motor
- hardened, polished pivots
- bearings, factory lubricated for life of the flasher
- available with or without radio interference eliminators

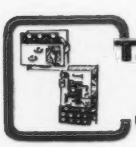
NEW ! !
Model 46
1 or 2 circuit, front-mounted cams and contacts out in the open for fast, easy adjustment, replacement. Compact size 4⅜" high, 4" wide, 2¼" deep



Model 3
1 or 2 circuits

Model 37 Jack-mounted
Available with or without meter base and cover, as shown, 1 or 2 circuits

Write for literature and specifications



TIME-O-MATIC, INC.
A SIGN OF GOOD CONTROL SINCE 1932
P.O. Box 850, Danville, Illinois, Phone Hickory 2-0611
Canadian Agent: Sangamo, Ltd. • Leaside, Toronto 17 Canada

Applications

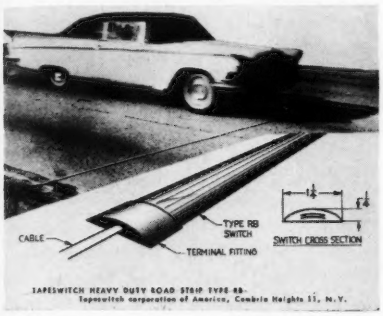
Safety Zones
Caution Signals
Traffic Islands
Loading Zones
Warning Beacons
Flashing Stop Signs

Strictly Business

Ribbon Switch For Vehicle Detection

A new heavy duty Ribbon Switch for vehicle detection is being produced by Tapeswitch Corporation of America, Cambria Heights, New York.

Like other Tapeswitch products, the new type RB (Roadbed) switch contains contacts along its full length, and closes its circuit whenever a vehicle passes over it. Cable type jacketing is of durable vinyl. The strip is 1¼" wide, ¼" thick, and is supplied in 50 foot rolls. End fittings are available.



TAPESWITCH HEAVY DUTY ROAD STRIP TYPE RB
Tapeswitch corporation of America, Cambria Heights 11, N.Y.

For temporary use, the switch may be cemented or anchored to the road surface, but for permanent or hidden installations, a groove ¼" deep should be formed in the black top or concrete during construction.

Applications for this strip include all types of vehicular counting, timing, and signaling. This new product is of special value for permanent modern gas station signaling.

New Research Firm In Toronto

The Traffic Research Corporation Ltd. is a new subsidiary company of KCS Limited. This company has been formed to concentrate the considerable experience, skills and facilities of KCS Limited towards the solution of today's many and vexing traffic problems.

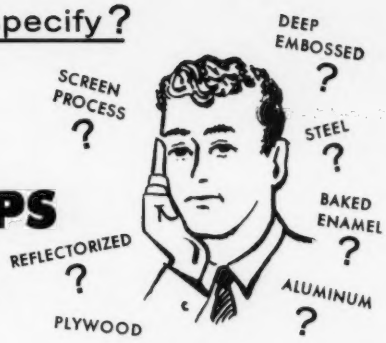
KCS Limited already has worked out new answers to traffic problems by using teams of engineers, statisticians, economists and accountants backed by powerful electronic facilities.

Among current and past projects are:

Development of large-scale metropolitan traffic plans for expressways, public transit and commuter lines.

A revolutionary new automatic system of controlling traffic signals by the use of radar counters linked to a central electronic computer.

What signs shall I specify?



LYLE'S SIGN SERVICE HELPS YOU DECIDE

New sign materials and processes and modern methods of handling the old, provide important new ways to solve your signing problems. And Lyle, as a manufacturer of quality street marker and traffic control signs, has available *all types* of sign materials and styles to meet your various requirements. That's why the experience of LYLE'S sign representatives in helping to solve signing problems for dozens of cities and towns can be so valuable to you now.

And, whatever materials you select, Lyle's know-how assures you of highest quality. For example, tested and time proven, the steel blanks are a hot dipped, continuous process galvanized material, bonderized after fabrication. This special steel Lyle uses costs so little more than non-rust proofed material—yet lasts many times longer. Available too, are various types and gauges of aluminum sheeting and extrusions, and high density plywood.

Consider also finishes. Choose from baked enamel or reflective materials. Available are the latest and most improved types of reflector buttons, reflective sheeting, reflective spheres applied directly by Lyle to binder material overlaid on baked enamel, and reflective liquid coating.

Processes available include Lyle's famous deep embossing for highest legibility due to 3rd dimension, flat lettering and screen processing.

When baked enamel finish is indicated, LYLE provides the highest quality you can buy, and at competitive prices. The photo above shows a section of Lyle conveyor type baking ovens. Specially formulated paints are applied with controlled pressure. Then, carefully timed at controlled temperature, the finish is baked for a sparkling lustre, free from blemishes, blisters or cracks of any kind. Presto! An attractive, durable sign.

Write for Lyle's free Sign Manual B-55 and the name of your nearest Lyle Sign Representative, if you don't already know him.

Lyle SIGNS, INC.
2722 University Avenue S. E.
Minneapolis 14, Minnesota

Studies of alternative subway routes employing computer models of transit traffic. The detailed comparison of the Bloor-University route with the proposed U-line for Toronto's new east-west subway is an example of such studies.

Traffic forecasts for airlines, railways, shipping and automobile traffic based on advanced statistical methods.

Transportation studies for the distribution of industrial products. Scheduling of industrial truck fleets.

Maintenance and replacement of airborne, seaborne and land vehicles.

Location of industrial plants, warehouses, depots and retail outlets.

The complexity of modern traffic problems and the tremendous costs associated with meeting problems emphasize the need for a Traffic Research centre. In its new subsidiary, Traffic Research Corporation, KCS Limited will bring to bear on these problems the broad experience of a diversified group of professionals backed by the most modern equipment for analysis. The development of better solutions to Traffic and Transportation problems is the one objective of Traffic Research Corporation Ltd.

The new firm is located in Toronto at 20 Spadina Road.

Aerial Ladder Truck Available

McCabe-Powers Body Company has announced production of its new Service-Master Body. Changes have been made in the exterior lines and compartments following suggestions from users throughout the country.

Standard no-extra-cost features of the body include: non-binding nylon door hinge bushings; fully-enclosed steel wheelhousings that protect compartment walls from road debris; tread-plate steel cargo area floor with ample drainage to prevent rust-inducing puddles; reinforced doors with recessed, key-locking latches; safety catches on all doors; adjustable shelves and parts bin with hinged cover and removable bin dividers. To retard corrosion, bodies are treated with liquidized iron phosphate and coated with red oxide primer before painting.

An aerial ladder, available in two models and in 26′ and 30′ lengths, can be furnished with the body. The Model ML Ladder is elevated by a manual hydraulic pump and the Model LH Ladder by a motor-driven pump powered by the truck battery. Both models

rotate 360 degrees and extend to desired length manually.

Other optionals include: all-steel canopy top which furnishes fully-enclosed cargo space having 53″ floor-to-roof height, telescopic roof over cargo area, overhead ladder and material racks with adjustable ladder guides, side-mounted pipe racks, vise bracket with pipe support and safety-step rear bumper.

A six-page folder describing the entire line of Service-Master Bodies and optionals can be obtained from McCabe-Powers Body Company, 5900 North Broadway, St. Louis 15, Missouri.

Traffic Expediting Offered on License Basis

New methods or systems to promote the continuous 4-way flow of traffic in higher volumes, with less likelihood of jamming or imperiling pedestrians, are being offered for license by John K. Masten, of Traffic-wise Process Co., 520 Fifth Ave., New York 36, N. Y., under Patents 2,926,332 and -3.

These give special attention to the congested grid-style or checkerboard type of central business district, especially where the blocks were considered too small for good control.

Extensive research and development is also being pressed in the field of 2-way arteries having closely spaced signals. Additional new network and arterial patents are pending.

It is predicted by this company, that the trend toward super-blocks and the removal of roads and traffic in the effort to move more traffic, will be reversed where the layouts are regular, and that the greater number of blocks and roads in a given area will provide for greater commerce—the extended traffic and trade between places.

G. E. Unveils Residential Luminaire

A new mercury vapor luminaire, tailored specifically for residential lighting, has been developed by the General Electric Company.

The new unit, latest in G. E.'s Type-M line, incorporates a radical change in refractor lens design that will boost street lighting efficiency and turn brightness away from bedroom windows, according to company engineers.

C. J. Meloun, marketing manager for the company's Outdoor Lighting Department, said the M-250R, as it is designated, was developed to meet the growing public demand for adequate residential street lighting. "This unit can bring modern design and safe lighting to every tree-lined suburban street in the country," he declared.

The new luminaire, which will operate with 100-watt, 175-watt, or 250-watt "Bonus Line" mercury vapor lamps, is light-weight, compact and streamlined, Meloun said. He added that the new luminaire offers increased photometric efficiency for residential street lighting—3 times the light and 6 times the life of filament units of the same wattage.

The M-250R's Power Pack ballast was built in around the reflector, producing a more compact, lighter luminaire, company engineers said. The photometric efficiency of the unit was achieved by introducing curved surfaces to the refractor lens prism, allowing a 70 degree "bend" to light ray emission.

Engineers said previous designs had turned light only 20 to 25 degrees. The greater angle of the new unit turns light and brightness from bedroom windows and directs light along the street instead.

The lens works this way: Light from the lamp is refracted through the curved inner surface of the prism, reflected from a convex outer surface and then passes almost perpendicularly through the final transmissive plane. Key to the effectiveness of the new unit is the final near 90-degree angle, according to engineers.

Meloun said the new unit will contain all the operating benefits of the

(Continued on page 63)

Technical Notes

Prerequisites and Scope of Examinations For City and County Traffic Engineering Positions

This summary is based on a report of ITE Technical Committee 2B, Civil Service Requirements for Traffic Engineering Positions, under the chairmanship of Edward M. Hall. The Committee's report was approved by the Technical Council on September 13, 1960, for publication in condensed form as an information report.

This report is intended as a guide to those who must evaluate applicants for traffic engineering positions within a city or county. Brief descriptions of the various positions in "four level" and "two level" organizations are given, prerequisites for these positions are tabulated, and the scope of the examination for each position is outlined. Naturally, the complete evaluation of a candidate would normally consider his training and experience in addition to a written examination and/or an oral interview. Further, the complete evaluation of a candidate for the position of traffic engineer should include personality testing and generally should be based on oral rather than written examination.

Area of Application and Limitations

Cities with four levels of professional traffic engineering and counties with two levels were initially selected as most typical and were used to develop the concepts being presented.

The transportation and traffic administrator—a fifth level administrative position common only to the largest urban areas is not covered in this report.

Personnel policies of most states are well established, therefore state government is excluded from this report.

As the project developed, it became clear that the "two level" city would normally be very similar to a "two level" county and that the "four level" city and county would also be similar. Therefore, this report is organized by the number of responsibility levels.

The recommended prerequisites and suggested scope of examination are intended only as a guide. Interpolation and judgment should enable use of the recommended standards in various situations. It is emphasized that there are criteria in addition to prerequisites and written examination for use in the selection process.

Proposed Standards

A. Description of Positions

The descriptions of responsibility level for each position listed below are of a general nature. Somewhat more detailed specifications may be obtained from Institute headquarters.

1. Organization of four position levels—city or county

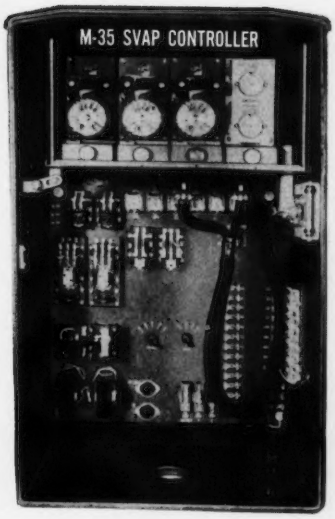
Position	Responsibility Level
a. Transportation & Traffic Administrator	A top administrative position in the largest communities and not covered in this report.
b. Traffic Engineer	Full responsibility for conceiving, executing and directing the technical and, usually, the administrative functions of the traffic engineering unit of government. Establish the procedures, and supervise the activities of subordinate engineers without recourse to higher authority, except as to general policy. Experience should include successful administrative and executive ability. (Equivalent to ASCE grade VII or Federal GS-14)[a]

[a] Equivalent to ASCE grade VIII or Federal GS-15 only if Traffic Engineer reports directly to the Chief Executive or Commission.

the perfect combination

M-35 SVAP

Semi-Vehicle and Pedestrian Actuated Traffic Controller

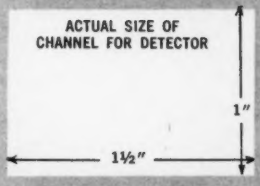


- TO CREATE AN IMPROVED ARTERY FLOW
- TO OPEN THE THROUGH BAND AT OFF-CYCLE INTERSECTIONS
- TO ACCOMMODATE A VARIABLE SIDE STREET VOLUME

With

M-100

Kemco Detector



The only simple, low cost installation detector available. Provides complete accuracy under all conditions.

THE MARBELITE CO., INC.
173-179 NORTH 10th STREET
BROOKLYN 11, N. Y.
EVergreen 8-4742

Robert F. Groby

Robert F. Groby, Associate Member, ITE, died September 1. At the time of his death, he was district traffic engineer for the Michigan State Highway Department, stationed in Cadillac, Michigan.

After attending Albion College for two years, Mr. Groby soon joined the State Highway Department as traffic investigator. In 1941 he was placed in charge of traffic engineering in a district, stationed first in Kalamazoo. In 1959 he was transferred to Cadillac.

He was 56 years old when he died.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946 AND JUNE 11, 1960 (74 STAT. 208) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF

Traffic Engineering, published monthly at Plainfield, New Jersey, for November, 1960.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Institute of Traffic Engineers, Inc., 2029 K Street NW, Washington 6, D. C. Editor, David M. Baldwin, 2029 K Street NW, Washington 6, D. C. Managing editor, Rebekah Friebely, 400 Watchung Ave., Plainfield, N. J. Business manager, None.

2. The owner is: Institute of Traffic Engineers, Inc. 2029 K Street NW, Washington 6, D. C.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 4000.

REBEKAH FRIEBELY
Managing editor

Sworn to and subscribed before me this 22nd day of September, 1960.
(SEAL)

WILLIAM L. CHRISTIAN
(My commission expires April 8, 1963)

c. Associate Traffic Engineer	Full technical responsibility for a major geographic or functional area within the scope of the traffic engineering unit, establish procedures and supervise the activities of subordinate engineers with only occasional recourse to higher authority for general guidance. The position requires professional training, successful experience, recognized leadership and independent judgment. (Equivalent to ASCE grade V or Federal GS-12)[b]
d. Assistant Traffic Engineer	Responsible for difficult technical projects or assignments under general supervision, individually or with a number of subordinates, with results subject to review by higher authority. The position requires professional training, previous experience and independent judgment. (Equivalent to ASCE grades III & IV or Federal GS-8 & GS-11)
e. Junior Traffic Engineer	Under immediate supervision responsible for specific technical projects for which the objective and technique would be specified and the results reviewed by higher authority. The position requires professional training, but little or no previous experience. (Equivalent to ASCE grades I & II or Federal GS-5 & GS-7)

2. Organization of two position levels—County or City

a. Traffic Engineer	Full technical responsibility for conceiving, executing and directing the technical and administrative functions of the traffic engineering unit of government. Under

b Equivalent to ASCE grade VI or Federal GS-13 only if Traffic Engineer reports directly to the Chief Executive or Commission.

TABLE I

GUIDING PREREQUISITES FOR TRAFFIC ENGINEERING POSITIONS

Organization of Four Position Levels

Position	Years of Engineering Experience [a, b]	Years of Traffic Engineering Experience [b]	Years in Responsible Charge of Traffic Engineering	Age (Min.)	Registration as Professional Traffic Engineer [c]
Traffic Engineer	12	8	5	35	Highly Desirable
Associate Traffic Engineer	8	4	1	25	Desirable
Assistant Traffic Engineer	6	2	0	—	No
Junior Traffic Engineer	4	0	0	—	No

a Each year in an approved engineering college, with graduation, is equivalent to one year in active practice of engineering.

b Successful completion of a prescribed postgraduate course of study in transportation or traffic engineering is equivalent to one additional year in active practice.

c Registration as Civil or Electrical Engineer or "Full Member" status in the Institute of Traffic Engineers acceptable in lieu.

general direction establish the procedures and supervise the subordinate engineers. The position requires professional training, successful experience, recognized leadership and independent judgment, with capacity for increased responsibility. (Equivalent to ASCE grade VI or Federal GS-13)[c]

b. Assistant Traffic Engineer — Responsible for difficult technical projects or assignments under general supervision, individually or with a number of subordinates, with results subject to review by higher authority. The position requires professional training, previous experience and independent judgment. (Equivalent to ASCE grades II & III or Federal GS-7 & GS-8.)

B. Recommended Prerequisites for Positions

1. Organization of Four Position Levels
   See Table I
2. Organization of Two Position Levels
   See Table II

C. Recommended Scope of Examinations (Non-Specialized)

The recommended approach is a guide to the selection of a well-rounded individual. It is believed that technical details can be mastered by someone with the proper attitude and background.

1. Organization of Four Position Levels
   See Table III
2. Organization of Two Position Levels
   See Table IV

D. Alternate Scope of Examination (Specialized)

For those cases where it is necessary to select an individual at the associate or assistant level with emphasis on specialization in either planning or operations this alternate scope is provided.

1. Organization of Four Position Levels
   See Table V
2. Organization of Two Position Levels
   Not applicable

c Equivalent to ASCE grade VII or Federal GS-14 only if Traffic Engineer reports directly to the Chief Executive or Commission.

ADDS OR SUBTRACTS AUTOMATICALLY
Shalda
MEASURE METER
Only the Shalda measure meter subtracts by backing up. This direct-reading measuring device records accurately to 10,000 feet in feet and 10ths or 12ths. The one-man-operated Shalda weighs only 3 lbs. and is available with either solid or telescoping handle for easier storage. Dual rubber wheels for control, balance, accuracy and sure grip action. Factory sealed and lubricated mechanism is protected against dirt, dust and moisture.
MODEL D
ONLY $49.50
SEND FOR COMPLETE INFORMATION
WE ALSO HAVE A COMPLETE LINE OF MEASURING TAPES — ASK FOR PRICES
B.G. Reilly COMPANY
P. O. Box 231
No. Scituate, R. I.

TABLE II

GUIDING PREREQUISITES FOR TRAFFIC ENGINEERING POSITIONS

Organization of Two Position Levels

Position	Years of Engineering Experience [a, b]	Years of Traffic Engineering Experience [b]	Years in Responsible Charge of Traffic Engineering	Age (Min.)	Registration as Professional Traffic Engineer [c]
Traffic Engineer	8	4	1	25	Highly Desirable
Assistant Traffic Engineer	5	1	0	—	No

a Each year in an approved engineering college with graduation, is equivalent to one year in active practice of engineering.

b Successful completion of a prescribed postgraduate course of study in transportation or traffic engineering is equivalent to one additional year in active practice.

c Registration as Civil or Electrical Engineer or "Full Member" status in the Institute of Traffic Engineers acceptable in lieu.

TABLE III

GUIDING RECOMMENDATIONS FOR AREAS OF TESTING
AND THEIR RELATIVE WEIGHT IN TRAFFIC ENGINEERING EXAMINATIONS

Organization of Four Position Levels
(Non-Specialized)

Area	Relative Weight by Position			
	Traffic Engineer	Associate Traffic Engineer	Assistant Traffic Engineer	Junior Traffic Engineer
Administration	50	35	20	5
Supervision	10	10	5	2
Management	10	5	1	—
Public Relations	5	5	5	1
Communicating Ability	10	8	5	2
Fiscal	8	3	1	—
Laws	5	2	1	—
Maintenance of Equipment	2	2	2	—
Planning	30	30	30	10
Major Traffic Studies	10	5	5	3
Major Routes	4	8	5	2
Terminal Facilities	2	2	2	—
Mass Transit	2	2	2	—
Geometric Design	8	7	10	4
City and Regional Planning	2	4	2	—
Research	2	2	4	1
Operations	20	30	35	20
Operational Measurement and Capacity	5	5	8	5
Traffic Flow Characteristics	5	5	5	5
Vehicle and Driver Characteristics	2	5	5	—
Traffic Control Devices (Design, Installation, and Maintenance)	5	10	10	5
Terminal Facilities	2	3	5	3
Complaints and Referred Problems	1	2	2	2
Other Engineering*	0	5	15	65
Total	100	100	100	100

* Predominantly Civil and Electrical Engineering, Physics and Statistical Analysis.

Positions Available

SACRAMENTO COUNTY CALIFORNIA

Position: Highway Engineer Associate, to serve as assistant to the traffic engineer, in direct charge of all traffic activities.

Requirements: Engineering college graduate, or equivalent field civil engineering experience, plus two years additional experience.

Salary: $657 to $800 per month (California licensed engineers will immediately receive $800 per month).

Apply: James C. Ray, Traffic Engineer, Sacramento County Administration Building, 827 - 7th Street, Sacramento 14, California.

Position: Junior Civil Engineer, in the Traffic Section.

Requirements: Engineering college graduate, or equivalent field civil engineering experience.

Salary: $540 to $596 per month.

Apply: As above.

SAGINAW, MICHIGAN

Position: Traffic Engineer, responsible to the City Engineer for all traffic engineering functions.

Requirements: Engineering college graduate, plus two years in traffic engineering, or equivalent combination of education and experience.

Salary: $7895 to $8875 per year.

Apply: Personnel Department, Room 201, City Hall, Saginaw, Michigan.

VILLAGE OF BLOOMINGTON MINNESOTA

Position: Streets and Traffic Engineer, to be in charge of all traffic engineering and street construction, reporting to the Director of Public Works, who is also Village Engineer.

Requirements: Civil engineering graduate with special training in traffic engineering. Experience in street traffic engineering for six years on a professional level, with two years of such experience after registration. Must become registered in Minnesota in 6 months.

Salary: Starting salary from $7,000 to $9,000, depending on age and experience.

Apply: Personnel Department, Village Manager's Office, 10200 Penn Avenue South, Bloomington 20, Minnesota.

TABLE IV

GUIDING RECOMMENDATIONS FOR AREAS OF TESTING AND THEIR RELATIVE WEIGHT IN TRAFFIC ENGINEERING EXAMINATIONS

Organization of Two Position Levels
(Non-Specialized)

Area	Relative Weight by Position: Traffic Engineer	Assistant Traffic Engineer
Administration	30	15
Supervision	8	3
Management	3	0
Public Relations	5	4
Communicating Ability	5	5
Fiscal	3	1
Laws	5	2
Equipment Maintenance	1	0
Planning	30	30
Major Traffic Studies	10	6
Major Routes	6	6
Terminal Facilities	2	5
Mass Transit	0	0
Geometric Design	6	10
City and Regional Planning	5	2
Research	1	1
Operations	35	40
Operational Measurement and Capacity	7	10
Traffic Flow Characteristics	7	7
Vehicle and Driver Characteristics	7	7
Traffic Control Devices	10	10
Terminal Facilities	1	3
Complaints and Referred Problems	3	3
Other Engineering*	5	15
Total	100	100

* Predominantly Civil and Electrical Engineering, Physics and Statistical Analysis.

Note: Table V is on page 52.

Irving J. Mack

Irving J. Mack, Associate Member, ITE, died suddenly at his home in Short Hills, New Jersey, on September 5. Mr. Mack was vice-president of the Elastic Stop Nut Corporation of America at the time of his death.

Irving J. Mack

A charter member of the Institute of Traffic Engineers, Mr. Mack had been connected with ESNA since 1926, when the firm was known as the American Gas Accumulator Company. He was involved in much of the early work on traffic signals and signal timing, and served on the ITE Standards and Specifications Committee of the early 30's. In later years he had been responsible for production at the Elizabeth (N. J.) plant of A'G'A—now ESNA—which has been principally concerned with reflectors and their application to highway signing and delineation.

Mr. Mack attended Carnegie Tech, majoring in physics. In addition to his ITE membership, he was a member of the Society of Automotive Engineers and various civic organizations in and near his home. He was 54 years old.

CITY OF NEW ROCHELLE NEW YORK

Position: Traffic Engineer, to serve as head of new traffic engineering bureau, responsible to City Manager. Will have full responsibility for planning, design and operations, including off-street parking program.

Requirements: Civil engineering graduate, with 8 years of highway or related experience, including two years in a responsible traffic engineering position. Must be registered in New York.

Salary: $10,770 to $13,610 (in increments over 4 years)

Apply: Warren Meyer, Director of Personnel, 515 Main Street, New Rochelle, New York.

SAINT JOHN, NEW BRUNSWICK

Position: Traffic Engineer, to organize and initiate a traffic engineering program for a city of 55,000 in an urban area of 90,000.

Requirements: Qualified man—submit full details on education, experience, and personal background.

Salary: Commensurate with qualifications and experience.

Apply: Common Clerk, City Hall, Saint John, New Brunswick, Canada.

LANCASTER, PENNSYLVANIA

Position: City Traffic Engineer—for position with tremendous challenge in comprehensive traffic planning of a regional nature.

Requirements: College graduate in civil and traffic engineering with at least 3 years of responsible experience.

Salary: About $9,000 and expenses.

Apply: E. Richard Falck, Planning Director, Public Safety Building, Lancaster, Pennsylvania.

DISTRICT OF COLUMBIA DEPARTMENT OF HIGHWAYS AND TRAFFIC

Traffic Engineering Division

Position: Traffic Engineers.

Salary: $6,435-$7,425.

Requirements: BS degree, preferably in CE or EE. Available positions include duties in (1) signal layout and coordination; (2) design of traffic signals and

street lights; and (3) operational experience in applying all phases of traffic engineering to city problems. Experience in one or more of these duties is required.

Office of Planning and Programming

Position: City and Highway Plans Analyst
Salary: $7,560-$8,860.
Requirements: Degree with experience in city and highway planning.

Position: General Engineer.
Salary: $7,560-$8,860.
Requirements: Degree, preferably in CE with experience in planning highway systems and right-of-way engineering.

Materials Development and Research Division

Position: Highway Research Engineer.

Salary: $7,560-$8,860.

Requirements: BSCE degree with experience in research, design, and development of materials.

Benefits: Federal retirement, sick and vacation leave, and participation in insurance and health benefit plans.

Apply: Personnel Officer, Department of Highways and Traffic, District of Columbia Government, 14th and E Streets, N. W. Washington 4, D. C.

SUSTAINING ORGANIZATIONS

Name to be added to list published in September 1960 issue:

Minneapolis-Honeywell Regulator Co.
Heiland Division
5200 E. Evans Ave. Denver 22, Colorado
Robert W. Yeager, Representative

Warning for people who think they can drink and drive: "If you hic—hike."

TABLE V

GUIDING RECOMMENDATIONS FOR AREAS OF TESTING
AND THEIR RELATIVE WEIGHT IN TRAFFIC ENGINEERING EXAMINATIONS

Organization of Four Position Levels

(Specialized)

Area	Relative Weight by Position					
	Traffic Engineer	Associate Traffic Engineer		Assistant Traffic Engineer		Junior Traffic Engineer
		Planning	Operations	Planning	Operations	
Administration	50	35	35	20	20	5
Supervision	10	10	10	5	5	2
Management	10	5	5	1	1	—
Public Relations	5	5	5	5	5	1
Communicating Ability	10	8	8	5	5	2
Fiscal	8	3	3	1	1	—
Laws	5	2	2	1	1	—
Maintenance of Equipment	2	2	2	2	2	—
Planning	30	40	20	40	25	10
Major Traffic Studies	10	5	3	10	5	3
Major Routes	4	10	2	5	4	2
Terminal Facilities	2	7	4	5	2	—
Mass Transit	2	2	1	2	2	—
Geometric Design	8	8	5	10	5	4
City and Regional Planning	2	5	2	5	2	—
Research	2	3	3	3	5	1
Operations	20	20	40	25	40	20
Operational Measurement and Capacity	5	5	10	5	10	5
Traffic Flow Characteristics	5	5	5	5	5	5
Vehicle and Driver Characteristics	2	2	5	5	5	—
Traffic Control Devices (Design, Installation and Maintenance)	5	2	10	3	10	5
Terminal Facilities	2	4	5	5	5	3
Complaints and Referred Problems	1	2	5	2	5	2
Other Engineering*	—	5	5	15	15	65
Total	100	100	100	100	100	100

* Predominantly Civil and Electrical Engineering, Physics and Statistical Analysis.

Board of Direction Meets in Chicago

The Board of Direction met September 10 and 11 in Chicago and again on September 14 following the election of new officers and directors.

The following significant action was taken at these meetings:

(1) A total of 104 membership cases were considered, with these results: 19 Juniors transferred to Associate; 8 Associates transferred to Member; 28 elected Junior Member; 24 elected Associate Member; 2 elected Member; 1 former Member re-instated; 2 transfers declined; 11 new applicants declined; 9 cases postponed for additional information.

(2) The Board voted to invite Wm. A. Bugge, Washington Director of Highways, to become an Affiliate of the Institute.

(3) After a review of the returns to the membership questionnaire, the Board decided to develop the necessary constitutional and by-laws amendments which would: (a) Create a new Student grade of membership; (b) Eliminate all present age limits for membership; (c) Set a maximum of 8 years in grade for Junior members; (d) Otherwise revise the rules to create a new fifth grade of membership.

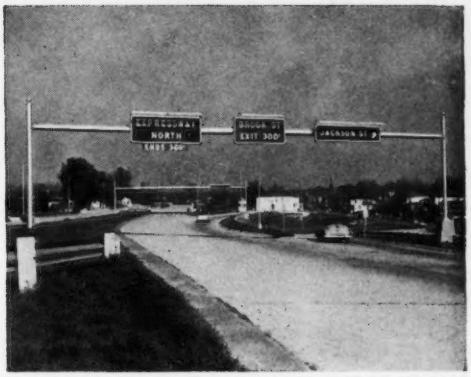
(4) A policy was adopted which would permit Juniors to advance to Member in one step if qualified.

(5) A policy was adopted that a brief biographical sketch and a picture of each candidate for national office be distributed to all members late in July of each year.

(6) At its first meeting, the Board voted to cease the issuance of awards based on the Annual Inventory but not to cancel its support of the inventory phase of the program. At the second meeting, the Board voted to reconsider this action, and postponed a decision until the January meeting pending further study of the questionnaire returns.

(7) Approval was voted for the revised Manual of Uniform Traffic Control Devices, with an accompanying recommendation to the Joint Committee urging further study to bring the standards to a more acceptable level. Comments by members of the Technical Council were directed to the In-

Select the design...

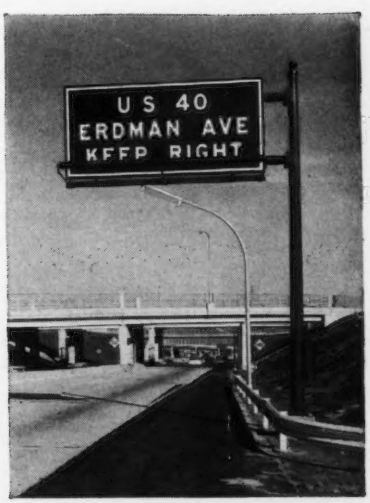


SPAN SUPPORT

CENTERMOUNT SUPPORT

to best solve...

your traffic flow problem



CANTILEVER SUPPORT

UNION METAL

Overhead Sign Supports

THE UNION METAL MANUFACTURING COMPANY

CANTON 5, OHIO BRAMPTON, ONTARIO, CANADA

stitute delegation to the Joint Committee for presentation at the appropriate time.

(8) Section Constitution and By-Laws changes were approved for the Midwest, New York Metropolitan and Washington, D. C. Sections.

(9) A new Sustaining Organization was approved—Minneapolis-Honeywell, Heiland Division, Denver, Colorado.

(10) The site of the 1963 Annual Meeting was determined as Toronto, with the dates set as August 25-29.

(11) A policy statement submitted by the Technical Council was approved on the matter of Technical Council—Local Section relations. The policy, which will be given publicity in the magazine and elsewhere, directs Sections to report through channels plans for technical studies or research, and requires the Technical Council to review and approve before publication all reports of such work which involve standards, policies or recommendations.

(12) Other action included acceptance of financial and committee reports, and routine business of the Board.

Technical Council Meets in Chicago

The Technical Council met in Chicago on September 11, 12 and 13. The following brief statements indicate the Council's action on important points of general interest.

1. Voted to recommend to the Board of Direction that they approve the revised "Manual on Uniform Traffic Control Devices." The approval was supplemented by a statement urging further revisions as soon as possible to bring the standards to a more acceptable level.

2. A statement of policy with regard to the relationship between the Technical Council and Local Section technical activity was adopted. The aim of this statement is to encourage an interchange of technical information in an orderly manner. It was voted to recommend to the Board that they adopt the statement.

3. The Technical Council reviewed and took action on 4 committee reports.

a) Committee 2A—"Careers in Traffic Engineering"

A draft of the report was accepted, subject to editing. The report will eventually become an attractive booklet aimed at encouraging high school students to look into traffic engineering as a career.

b) Committee 2B—"Prerequisites and Scope of Examinations for City and County Traffic Engineering Positions."

The report of this committee was accepted by the Council. It is published in an edited form in this issue of *Traffic Engineering* magazine and will also be available at Headquarters. Briefly the report suggests the responsibility level for traffic engineers in city and county positions, tabulates the desired years of experience for various positions and tabulates the areas of testing with suggestions of weight to be given various subjects in traffic engineering examinations.

c) Committee 3B—"School Crossing Protection."

This report has been referred back to the committee with instructions to prepare a document which can be used for the formulation and improvement of national standards, namely the "Manual on Uniform Traffic Control Devices."

d) Committee 7G—"Volume Survey Devices."

The work of this committee was accepted as an information report. It is to be reproduced in mimeo form and will be available at Headquarters. Briefly, the report outlines the principle of operations, operating features, advantages and disadvantages of various devices for sensing vehicle presence, for recording this information, for transmitting the data from a remote location and for measurement of the data as a rate of flow. An appendix listing manufacturers is also included.

4. Mr. Gordon Gravelle was thanked for his work as Chairman for the year 1959-60. With his election as vice-president, Mr. Robert Burch becomes the new chairman of the Technical Council.

MINUTES

ANNUAL BUSINESS MEETING
INSTITUTE OF TRAFFIC ENGINEERS

Edgewater Beach Hotel
Chicago, Illinois
September 13, 1960

Call to Order

The meeting was called to order by President Wetzel at 2:50 p.m. with approximately 210 members present.

Tribute to Deceased Members

Mr. Burch read the names of members who had died since the last meeting:

Elmer Clees—Associate
Died—September 15, 1959
Sam Osofsky—Associate
Died—October 25, 1960
Charles J. Tilden—Honorary
Died—November 15, 1960
Miller McClintock—Member
Died—January 10, 1960
Thomas D. House, Sr.—Member
Died—January 21, 1960
S. Herbert Taylor—Member
Died—January 24, 1960
Clayton W. Paige—Member
Died—February 14, 1960
Julien H. Harvey—Honorary
Died—March 1, 1960
Robert M. Wray—Member
Died—May 20, 1960
William R. Welty—Member
Died—July 11, 1960
J. L. Wehmeyer—Member
Died—August 1, 1960
Junius H. Payne—Associate
Died—August 17, 1960
Robert F. Groby—Associate
Died—September 1, 1960
Irving J. Mack—Associate
Died—September 5, 1960

The announcement of the names was followed by a rising tribute and a moment of silence.

Report of the President

President Wetzel reviewed the accomplishments of the past year, in the technical membership and administrative areas.

(A copy of his remarks is attached to and becomes a part of these minutes.)

Appointment of Election Tellers

President Wetzel announced the appointment of tellers for the election as: E. H. Olcott, chairman, Walter Q. Macnee and Harry Porter, Jr. After a final call for ballots, the tellers retired to tally the votes.

Report of the Administrative Vice President

Vice President Malo reported for the Administrative Division, indicating that several of the Division's projects would be covered later in specific agenda items. In connection with the Annual Inventory program, however, he reported two actions by the Board of Direction at the meeting September 10-11, 1960:

(a) A vote to continue the Annual

Inventory Committee as official advisor. thus continuing ITE support of the inventory phase of the program;

(b) A vote to discontinue the issuance of awards by ITE based on the Inventory. In this connection, he cited the somewhat inconclusive results of the recent questionnaire, which indicated both a majority in favor of awards and a large number of specific (and some rather strong) disagreements with the present procedure.

Report of the Technical Vice President

Vice President Gravelle reported on the work of the Technical Council, citing the following specific items:

(a) The establishment of a definite time schedule for project committees;

(b) The transfer to the Technical Council of the Committee on Inter-Vehicular Signal System;

(c) The naming of five new Department Heads;

(d) The appointment of a Staff Engineer;

(e) Extensive consideration of the proposed revision of the Uniform Manual;

(f) Early work on the 1961 Annual Meeting technical program;

(g) Completion of nine reports by project committees;

(h) Appointment of the Review Committee for the Technical Development and Research Fund, of T. J. Seburn (chairman), George W. Howie and C. F. McCormack. Industry representatives named by the contributors—Paul L. Green and Armand E. Keeley.

(i) Appointment of a committee to review and revise for reissuance the "Manual of Traffic Engineering Studies," under the chairmanship of D. E. Cleveland.

Report of the Secretary-Treasurer

Mr. Burch reported on the membership status as of September 1, 1960, as follows:

Members	349
Associate Members	627
Junior Members	306
Affiliates	53
Honorary Members	5
Inactive	3
TOTAL	1,343

Action by the Board at the meeting September 10 and 11 added 2 Members, 24 Associate Members and 28 Junior Members. One former Member was re-instated, 8 Associate Members were transferred to Member, and 19 Junior Members were transferred to Associate Member.

Mr. Burch also reported that the financial affairs were in order, with the Institute operating on a balanced budget. Total income for 1960 was estimated at $106,000, and expenses at $103,000 for the operating fund. Of the anticipated income, $66,000 will come from advertising, $20,000 from dues, and $20,000 from other sources.

Through August 31, 1960, income was approximately $69,000 and expenses $70,000. The Technical Development and Research Fund had a separate balance of $13,000, and the Fee Fund a balance of $19,000.

Report of the Executive Secretary

The Executive Secretary made a brief report, citing the growth of the organization and the corresponding increase in activities. He reported the total

MIRO-FLEX TRAFFIC CONTROL SIGNS

Miro-Flex easy-to-see embossed signs – give extra safety, when safety counts! Embossed design and raised letters add extra strength and rigidity for years of rugged service – outlast ordinary flat-surface signs by far! Miro-Flex quality finish is baked on to stay – stands up in any kind of weather. And, raised letters are easier to read – in Miro-Flex street name assemblies, traffic control, and signs of all types. Street name assemblies are available in rust-proof steel or aluminum. So choose Miro-Flex signs, for easier readability and longer service – to give extra safety, when safety counts! Write for free Miro-Flex catalog of quality street name assemblies and traffic control signs, today!

The MIRO-FLEX CO., INC.
1824 EAST SECOND WICHITA 14, KANSAS

Standard Traffic Signs Available for Immediate Delivery at Northeastern Warehouse
Koontz Equipment Corporation, 325 Ohio River Blvd., Emsworth, Pittsburgh 2, Pa.

headquarters staff as consisting of six people, and paid tribute to the devoted help of the feminine members of the staff. He introduced the new Staff Engineer, Mr. Stephen G. Petersen. He also announced the maintenance of a "headquarters" office in the hotel and invited inspection of materials on display there. Finally, he expressed his appreciation to President Wetzel and members of the Board for their help during the year.

Mr. Ralph Michel, from the floor, suggested the distribution to the membership of a detailed financial statement of the Institute. President Wetzel agreed that some kind of statement could be made available.

Report of the Resolutions Committee

Mr. Normann, chairman, presented six resolutions for adoption. These related to the following subjects:

(1) World Traffic Engineering Conference.
(2) Development of Long Range Highway Improvements.
(3) Acquainting Public with True Picture of Highway Improvement Programs.
(4) Urban Transportation Systems.
(5) Appreciation to Annual Meeting Committee.
(6) Appreciation to Retiring Board Members.

Approval of each resolution was duly VOTED, with dissenting votes for Resolution No. 3.

(Resolutions as approved are attached to and are a part of these minutes.)

Report of the 1960 Annual Meeting Committee

Mr. Olmstead, chairman, reported registration figures to date at 620 men and 209 women, for a total of 829, the largest Annual Meeting registration ever recorded.

Report of 1961 Annual Meeting Committee

Mr. Marsh, chairman, reported plans for the 1961 meeting scheduled for Washington. Called the "World Traffic Engineering Conference," the meeting will include the 31st Annual Meeting of the Institute, August 21 to 23 and the 6th International Study Week in Traffic Engineering, August 24 to 26. The Conference will be followed by a bus tour, August 28 to September 1 or 2, extending from Washington to New Haven or Boston. Also expected to be held near these dates is a Seminar for Traffic Experts of the Organization of American States—Pan American Union.

Program chairman for the 31st Annual Meeting is C. C. Robinson, and for the U. S. portion of the International Study Week is C. W. Prisk.

A good attendance from overseas is anticipated, as is a large representation from the U. S.

Amendments to the Constitution and By-Laws

Mr. Burch presented for discussion the six propositions previously circulated to all voting members, each amending a section of the Constitution or By-Laws of the Institute.

Proposition No. 1, relating to the number of meetings each year of the Board of Direction, was read and it was VOTED to amend by adding the following at the end of the first sentence: "and one meeting shall be held during the month of January in each calendar year."

Proposition No. 2, relating to the number of votes on the Board of Direction required for expulsion, was read, and it was VOTED to amend by making the fourth sentence read: "The final action of the Board shall be taken at a later meeting, and at least 8 votes to expel shall be required for expulsion."

Prosposition No. 3, relating to life membership, was read, and it was VOTED to amend the proposal to read:

> "Sec. 8. When any Member or Associate Member in good standing has reached the age of sixty-five and has paid dues for twenty-five years, including the current year, as a Member or an Associate Member or a combination of the two, the Board of Direction shall automatically waive payment of further dues by him."

Proposition No. 4, relating to the beginning of the Institute year for officers, was read, and it was VOTED to add, after the word "officers" in the first sentence, the words "and directors."

Proposition No. 5, relating to the size and make-up of the Nominating Committee, was read. No amendments were offered.

Proposition No. 6, relating to the Technical Development and Research Fund, was read, and it was voted to amend Sec. 3 to add after the words "Review Committee" the words: "the Institute members of which shall be".

Other Business

Mr. S. T. Siegel, from the floor, requested further explanation of the decision of the Board in regard to awards, as reported by Mr. Malo. Mr. Malo commented in greater detail on the questionnaire returns and the factors which influenced the Board.

Mr. J. E. Havenner moved that the membership express itself through a vote of confidence as approving the Board's handling of the matter, recognizing their responsibility for making such decisions. After discussion, Mr. Havenner withdrew the motion.

Mr. W. R. McGrath then moved that the Board be requested to reverse its position in the matter of issuing awards. The motion was lost for want of a second.

On a motion by Mr. Harold Bauerle, it was VOTED to request the Board to reconsider its action on the award program.

Mr. Wm. Canning, from the floor, called attention to the fact that 1980 would be the 50th anniversary year for the Institute, and invited everyone to Pittsburgh that year. He requested that the invitation be referred to the Annual Meeting Committee.

Mr. Henry Osborne, from the floor, moved for reconsideration of the action taken previously on Resolution No. 3. After he was ruled out of order as not having voted on the prevailing side, Mr. Ricker made a similar motion and it was so VOTED.

After discussion, President Wetzel asked the Resolutions Committee, assisted by Messrs. Marsh and Osborne, to revise the preamble in light of the feeling expressed by the group. It was VOTED to approve the edited resolution to be produced by the committee.

(Note: The draft included with these minutes is the edited version.)

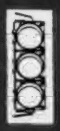
Report of Election Tellers

Mr. Olcott, for the tellers, reported the tally of votes as follows:

For President:	
A. F. Malo	633
For Vice President:	
G. K. Gravelle	591
For Vice President:	
R. A. Burch	587
For Secretary-Treasurer:	
J. Al Head	332
W. R. Marston	311
For Director, District 3:	
H. B. Woodling	79
For Director, District 5:	
F. G. Jordan, Jr.	104
For Director, District 6:	

• • • if you want completely adjustable traffic signals they're manufactured by only one company • • •

Traffic Signals, inc

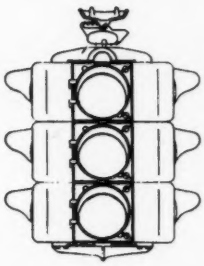
WHERE EACH SECTION AND EACH SIGNAL HEAD  FEATURES FULL CIRCLE 360°

ADJUSTABILITY THROUGH TRI-STUD MOUNTINGS BETWEEN SECTIONS

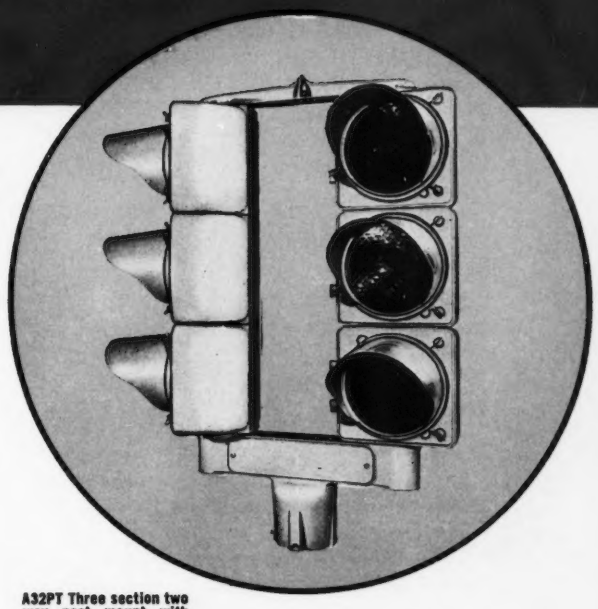
AND ON BRACKET MOUNTINGS FOR SIGNALS

This is because tri-stud mountings do not require serrations to hold each section firmly in place and can therefore be directionally adjusted to an infinite degree.

A31PM One way three section 4" post mounting



A33SW Three section three way span wire mounting



A32PT Three section two way post mount with terminal box

TRAFFIC SIGNALS		TRAFFIC SIGNAL CONTROLS	
Adjustable	Beacons	Pretimed Controls—Isolated or Interconnected	School Crossing Controls
Fixed Face	Downlite Beacons	Actuated Controls—Semi - Full - Traffic Density	Master Controls, Console type
Lane Control	School Signals	Pressure Detectors—Directional, Non-Directional	Flashing Controls
Pedestrian Signals	Barricade Systems	Magnetic Detectors—Surface, Sub-surface	Pedestals —Signals, Controls

Traffic Signals, inc.

ADVANCED ENGINEERING IN TRAFFIC SIGNALS AND TRAFFIC SIGNAL CONTROLS

P. O. BOX 1303 • 222 BEACH STREET • SHREVEPORT, LOUISIANA

A. L. Hutchison 159
Invalid ballots: 31

Mr. Wetzel re-read the report, and declared Messrs. Malo, Gravelle, Burch, Head, Woodling, Jordan and Hutchison elected. These men were invited to come forward and be recognized by the membership. Mr. Wetzel then expressed his thanks to Messrs. Barton, Greer and Sielski for their service on the Board.

Mr. Malo spoke briefly, expressing his feeling of pride, gratitude and humility at the honor accorded him.

Adjournment

There being no further business, the meeting was declared adjourned.

Respectfully submitted,
/s/Robert A. Burch
Secretary

RESOLUTIONS

30th Annual Meeting
Chicago, Illinois
September, 1960

Resolution No. 1

World Traffic Engineering Conference

WHEREAS, as a part of the World Traffic Engineering Conference, the Sixth International Study Week in Traffic Engineering is to be held in Washington, D. C. on August 24-26, 1961; and,

WHEREAS, the Institute of Traffic Engineers has recognized the professional values to be derived from the mutual exchange of information between traffic engineers of all nations and is acting as co-sponsor of this meeting; now therefore be it

RESOLVED that the Institute of Traffic Engineers and its members support the Sixth International Study Week in Traffic Engineering and encourage the attendance and participation of all persons engaged in traffic engineering pursuits. Such persons are also invited to attend the 31st Annual Meeting of the Institute of Traffic Engineers, August 21-23, 1961, which is also in Washington.

Resolution No. 2

Development of Long Range Highway Improvement Programs

WHEREAS, the National Committee on Urban Transportation sponsored and published "Better Transportation For Your City," A Guide to the Factual Development of Urban Transportation Plans, together with a series of procedure manuals in the interest of promoting comprehensive transportation planning; and

WHEREAS, a Joint Committee on Highways has been formed by AASHO and AMA to develop a better understanding and appreciation of the mutual problems facing communities in matters of highway planning and urban development; and

WHEREAS, the formulation of a rational transportation plan requires the coordination of all federal, state, and urban administrative agencies responsible for the many aspects of transportation and the cooperation of all political entities within the metropolitan area; and

WHEREAS, the resources of the several governmental units, even when pooled, are not adequate to produce integrated transportation systems, except through a program of development over extended periods of time; therefore, be it

RESOLVED that we, the members of the Institute of Traffic Engineers, express our appreciation and commend the cooperating organizations of the National Committee on Urban Transportation for the thorough work accomplished in producing the Guide and Manuals; and be it

FURTHER RESOLVED that we, the members of the Institute of Traffic Engineers, foster and encourage the development of long range highway improvement programs properly integrated with the transportation needs of the regions they are to serve.

Resolution No. 3

Acquainting Public With True Picture of Highway Improvement Programs

WHEREAS, the Institute of Traffic Engineers recognizes that there have been excellent overall accomplishments in the development of the National System of Interstate and Defense Highways; and

WHEREAS, the Institute has noted with concern several published articles and statements by apparently inadequately-informed persons, which statements and articles fail to present a balanced and complete appraisal of the overall situation, and which may, therefore, have misled segments of the public; and

WHEREAS, it is highly important to the continuance of satisfactory progress on the Interstate System program that the public be kept fully and accurately informed of progress, problems and benefits of the Interstate System; now therefore be it

RESOLVED that the Institute of Traffic Engineers and its members seek by every appropriate means to keep the public acquainted with the true, overall picture of the operation, progress, problems and benefits of the National System of Interstate and Defense Highways program.

Resolution No. 4

Urban Transportation Systems

WHEREAS, the rapid growth in population of urban areas has multiplied manifold the transportation problems in these areas; and

WHEREAS, every means available to the traffic-engineering profession and to urban planning must be used for the solution of urban transportation problems; and

WHEREAS, there has been insufficient reliable information regarding the relative merits and economics of the various forms of urban transportation, including private vehicle, bus and rail, to establish each in their proper relation with one another, with the result that in some cases the development of an adequate transportation system has been delayed rather than expedited; now therefore be it

RESOLVED that the entire membership of the Institute of Traffic Engineers take every opportunity to obtain the true facts and support research projects which will accelerate improved urban transportation systems.

Resolution No. 5

Appreciation to Annual Meeting Committee

WHEREAS, the program of professional and technical meetings and papers at this 30th Annual Meeting of the Institute of Traffic Engineers is contributing substantial technical information to those in attendance and is both stimulating and impressive in achieving the objectives of the Institute; and

WHEREAS, the large amount of time and effort devoted to the arrangements of accommodations and activities for this meeting by the general chairman and his eight sub-committees and members are recognized and appreciated; therefore, be it

RESOLVED that the Institute of Traffic Engineers expresses its sincere appreciation to Evan E. Olmstead, General Chairman of the Local Arrangements Committee and to the chairmen and members of the eight sub-committees and their wives, and to others including business and industry groups who gave so freely and willingly of their time and efforts toward achievement of the outstanding success of this Annual Meeting.

NEW! High Visibility Traffic Buttons Work to Protect Life...

Even in the rain!

Cast from impact-resistant Thiokol polysulfide-base material. Easy to install. Stay put for years. Add highway safety . . . night and day, fair weather and foul.

New THIO-LINE Traffic Buttons, composed of high visibility reflector glass beads embedded in durable THIOKOL liquid polysulfide polymer base material, have a raised dimension—insuring effectiveness even in weather which blanks out conventional markers.

Easy to install—THIO-LINE buttons are bonded in place in 10-60 minutes (depending on the temperature) over asphalt, concrete or brick by THIO-LINE liquid polymer-base adhesive with a grip like steel.

Long-lived—in six years of testing on busy California thorofares, 25,000 buttons of the THIO-LINE type have averaged 99.9% durability record. Life expectancy of THIO-LINE: 10 to 15 years on city streets compared to 2 months for paint and 6 months for plastic markers. 25 years on the open highway contrasted to 12 months for paint and 2 to 3 years for plastic.

Thiokol®
CHEMICAL CORPORATION
780 NORTH CLINTON AVENUE
TRENTON 7, NEW JERSEY
In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

*Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers, and other chemical products

THIOKOL CHEMICAL CORPORATION, Dept. TM-91
780 N. Clinton Avenue, Trenton 7, New Jersey
Gentlemen: Please send me your technical bulletin describing characteristics and installation procedures on THIO-LINE TRAFFIC BUTTONS, and a list of distributors.

NAME _____ POSITION _____
FIRM _____ STREET _____
CITY _____ ZONE _____ STATE _____

Resolution No. 6

Appreciation to Retiring Board Members

WHEREAS, the great strides made by the Institute of Traffic Engineers during the past year are largely due to the untiring and conscientious efforts of its officers and directors, and particularly to the leadership of Edward G. Wetzel who has served during the past eight years as director and officer, and during this past year as president; now therefore be it

RESOLVED that the membership of the Institute on this occasion, the 30th anniversary, at the time of completion of his presidency, hereby expresses its deep and sincere appreciation to him for his accomplishments during the past year and for his many years as officer and director, and for his contribution and devotion to the advancement of the profession of traffic engineering; and be it

FURTHER RESOLVED that the membership of the Institute also hereby expresses its appreciation to the retiring directors Eugene A. Barton, M. V. Greer and J. Al Head, for their serious and conscientious efforts in promoting the welfare of the Institute, and to the immediate past president, Matthew C. Sielski, for the work he has done, among other things, with respect to the Institute of Traffic Engineers Workshop and the implementation of the workshop recommendations.

* * *

The foregoing resolutions, Nos. 1 through 6, ADOPTED by the Institute of Traffic Engineers at its annual meeting held in Chicago, Illinois, on September 13, 1960.

ATTEST: DAVID M. BALDWIN
Executive Secretary

ANNUAL REPORT OF THE PRESIDENT

Past, Present and Future

Upon assuming the office of President a year ago, I noted that the fulfillment of the objectives and the progress of the Institute would in a large measure be determined by the interest, the cooperation and the support of the membership. I am glad to report that your officers and directors have been greatly encouraged by the increasing interest and activity of the membership, and we feel that a new era is beginning which will see the Institute continue to grow and maintain its prominent position among other professional groups. We also feel that as individuals our members have demonstrated their abilities in knowledge and leadership which should further enhance the profession and strengthen the Institute.

Looking back to the founding of the Institute 30 years ago, I'm sure we are proud of the small group of men (and several are with us today) who, recognizing the traffic and safety problems of that day decided to do something about it and, while busy with their work, organized the Institute of Traffic Engineers. Established as it was to relieve the traffic situation in the 30's, the Institute finds itself today in the 60's faced with similar but perhaps more complex problems—but with a sincere determination to continue working toward the solution of our transportation problems and the improvement of the economic welfare of our country.

I should like to briefly outline our activities and accomplishments during this year and our hopes for the future.

Workshop—The enthusiastic response to the Workshop last year gave encouragement to our Past President, Matt Sielski, and his Workshop Committee as they sought to carry out the recommendations of Workshop and the Local Sections. You will observe from the report of this Workshop Committee, which has been made available to you in the September issue of the magazine, that great progress has been made and most all the recommendations have been carried out or are in the process.

Freeway Operations Seminars—The success of the initial series of eleven seminars which were completed over a year ago has continued to be felt. As I reported in my letters to the membership, the Institute sponsored another seminar last November in Denver, and co-sponsored two other seminars this year—one at the University of Michigan and one at the University of Missouri. To be prepared for a continuing program of this type, a standing committee on Freeway Operations headed by Grant Mickle is ready to assist in the planning of future meetings of this type. I'm sure the membership shares my enthusiasm for this program and the service the Institute is able to perform in bringing to public officials, highway engineers and others, an awareness of the traffic operating problems that may be anticipated as additional miles of the Interstate Highway System are placed in operation.

Headquarters Staff and Operation—The larger operating budget for this past year reflecting the expanding nature of the organization and its program was made possible because of the membership's approval of the dues increase and the increased advertising rates for the magazine. Our budget, which is slightly over $100,000, excludes money from the sustaining organizations which goes directly to the Technical Research and Development Fund. With the increased income we have been able to add a staff engineer, Mr. Stephen Petersen, to give much needed assistance to our Executive Secretary, and another girl to provide additional clerical help in the headquarters office. In addition, we have been able to provide essential fringe benefits for this staff, including the first step of a pension plan for the headquarter's employees. I am sincerely grateful to our membership for the support they have given the Board of Direction and our headquarter's staff.

Technical Development and Research Fund—Beginning with 1959, the annual contributions from the sustaining organizations have been set aside as a Technical Development and Research Fund to provide needed assistance toward more effective technical work on the Institute. Proposition #6, a proposed amendment to the Constitution and By-Laws, which will be placed before you today, provides the "ground rules" for the creation and administration of this fund. A committee composed of representatives of the Institute and sustaining organizations will assist in the administration of the fund. The Technical Council is already reviewing suggestions as to the most effective use of a limited portion of the fund. This committee is now named, and ready to function.

Technical Activities—The Board of Direction has been encouraged by the renewed interest in the technical activities of the Institute as evidenced by the increasing productive work of the committees of the Technical Council. Of major interest, perhaps, is the Council's review of the revised draft of the Manual on Uniform Traffic Control Devices which was prepared by the National Joint Committee composed of representatives of the Institute of Traffic Engineers, AASHO, National Committee on Uniform Traffic Laws and

"LET ME SHOW YOU THE DIFFERENCE IN A TRULY WHITE, LEAD-FREE REFLECTIVE BEAD"

There is a marked difference in reflective bead quality, determined largely by degree of whiteness and lead-free quality. On these two important factors depends the brilliance, reflectivity and ultimate performance of the product. To meet Flex-O-Lite's rigid quality standards, only the *whitest white, lead-free* beads can pass inspection. Add to this, technological advances, long experience and manufacturing know-how and you have the reasons why highway signs and markers, reflectorized with Flex-O-Lite beads, literally leap out of the darkness to contribute greater safety for the motoring public . . . greater satisfaction and economy for you. Write for new brochure today.

FLEX-O-LITE PRODUCTS

1. No. 831 LEAD-FREE High Index of Refraction Beads and Sign Kits. Best for white and yellow signs.

2. UB 68 LEAD-FREE Medium Index of Refraction Beads and Sign Kits. For application to signs in the darker pigment colors—greens, reds, blues, etc.

3. TYPE H SAFETY SPHERES—For danger points such as guard rails, curbs, bridge abutments, medians, hydrants and other hazardous areas where ultra-high brilliance is required. Many times brighter than paint or ordinary reflectorization.

4. TRAFFIC BEADS—Free Flowing, Moisture-Proof and Standard Beads. Tops in eye-catching brilliance and dependable reflectorization on highway center lines and edge line markings.

5. ALL-WEATHER AIRPORT RUNWAY BEADS—500 to 1,000% brighter than standard beads at angles of descent ranging from 10 to 30%.

6. FLEX-O-LITE ALSO MAKES: New Positive Free-Flowing Traffic and Sign Bead Dispensers. The economical answer to the problem of reflective glass bead application. Details on request.

FLEX-O-LITE

FLEX-O-LITE MANUFACTURING CORP.

8301 Flex-O-Lite Drive, St. Louis 23, Missouri • Flex-O-Lite of Canada, Ltd., P. O. Box 216, St. Thomas, Ontario, Canada • Paris, Texas

MAKERS OF DROP-ON, FREE-FLOWING, STANDARD, MILITARY, MOISTURE-PROOF, HIGH AND MEDIUM INDEX SIGN BEADS

Ordinances, the American Municipal Association and the National Association of County Officials. In addition to the completion of several Technical Committee reports, I should like to call your attention especially to the publication of an Institute standard, Technical Report #4, "A Model Performance Specification for Purchase of Pavement Marking Paint." This report was the result of the hard-working Committee on Paint and Bead Specifications, in Department 7 of the Council.

Life Membership—After consideration for some time the Board of Direction is pleased to offer today, among the proposed amendments to the Constitution and By-Laws, a proposal which provides life membership, including a waiver of dues, for certain long time members of the Institute. It is especially appropriate at this 30th Annual Meeting to offer this proposal and honor those eligible—Members and Associate Members in good standing who have reached the age of 65 and have paid dues for 25 years. I'm sure we can count on your support.

Local Sections—It is indeed gratifying to me as it is to the entire Board of Direction to note the increasing interest and activity among the local sections. The active participation of the local sections in reviewing and commenting on the Workshop recommendations and on other matters referred to the Sections has been most encouraging. Your long list of suggested items to be discussed at the annual joint meeting between the Board and the Section officers, scheduled for Thursday morning, is again a manifestation of your interest in the Institute affairs. To satisfy the need for uniformity in the operations of local sections, sections have been furnished a draft of the proposed Local Section Manual including a model constitution and by-laws. The response from the local sections to this manual has been most favorable.

Outlook—Through a series of letters during the past year, I have tried to keep the members currently informed on actions of the Board and the management of the Institute affairs. Your interest indicated by your personal letters to me has been most encouraging. Your Board of Direction has endeavored to be responsive to your desires. We hope to maintain and further develop closer relationships among the membership and management of the Institute. As we move ahead this year and future years, I feel sure that with your continuing support and active participation we shall achieve our goals.

Sept. 13, 1960 EDWARD G. WETZEL
President

1960 ANNUAL REPORT of the TECHNICAL COUNCIL to the BOARD OF DIRECTION

Meetings

The Technical Council held two meetings during the year, both of them in Washington. The Winter Meeting was on January 9 and 10, the Spring Meeting on June 3 and 4. The next meeting is scheduled for September 11, in Chicago.

Organization

Continuing its work under the organization plan derived at Miami Beach 2 years ago, the Technical Council has had an active year. Despite a large turnover in Department Heads (five resigned last January), the Council has been able to maintain eleven active project committees. Under the limitations of the "Rules of Procedure" which allow no more than three committees for each department, this figure shows an average of two active committees in each department.

At its Winter Meeting the Council amended its "Rules of Procedure" to accomplish a realignment of departments. The changes involved the elimination of Traffic Study Techniques from Department 2, the grouping of geometric design of both traffic and terminal facilities in Department 5 and the consolidation of planning in Department 6 under the heading "Transportation Planning." These changes were approved by you on January 16.

The Council accepted the Board's desire to transfer the "Committee on Inter-Vehicular Signal System" to the Technical Division. Currently, a scope is being sought from the committee so that it may be placed under the proper department.

Five new department heads were nominated by the members of the Council as follows:

Department 1—
Mr. Charles W. Prisk
Department 4—
Mr. Sam Cass
Department 5—
Mr. C. J. Keese
Department 6—
Mr. J. Edward Johnston
Department 7—
Mr. Marble J. Hensley

Mr. Cass and Mr. Hensley were appointed by you in January. The names of Charles W. Prisk, C. J. Keese and J. Edward Johnston are now offered to you for official appointment.

On July 1, the Staff Engineer authorized last year started working. As you know, Mr. Stephen G. Petersen was finally chosen for this position, which includes service as Secretary of the Technical Council.

Completed Work

The reports approved by the Technical Council and the disposition of each is as follows:

Committee 4B—"Warrants for Yield Right of Way Signs." Pertinent parts of the report were published in TRAFFIC ENGINEERING.

Committee 4E—"Warrants for Four-Way Stop Signs." Portions of this report were published in "Proceedings." The report will be acted on finally upon completion of minor revisions by the former department head.

Committee 5B—"Ramp Terminal Channelization." Accepted as an information report and published in "Proceedings."

Committee 6D—"Planning and Design of Airport Terminal Parking Facilities." Accepted as an information report and published in "Proceedings."

Committee 7A—"Specification for 12-Inch Adjustable Face Traffic Control Signal Heads." Report approved by Technical Council and submitted to you. Subsequent to your approval, the report was published as an addendum to Technical Report No. 1.

Committee 7C—"Traffic Sign Illumination With External Fluorescent Fixtures." Accepted as an information report and published in TRAFFIC ENGINEERING.

Committee 7D—"Model Specification for Pavement Marking Paints for Purchase on Basis of Performance Tests." Report approved by Technical Council and submitted to you. Subsequent to your approval, the report was published in TRAFFIC ENGINEERING and as a separate booklet.

Manual on Uniform Traffic Control Devices

A vote by mail ballot was conducted on this important matter. After further

discussion at the forthcoming Council meeting, it is hoped that the recommendations of this group can be presented to you during one of your meetings at the Annual Meeting.

Work in Progress

Special Committee on Section Relations

This special committee prepared a statement for the June meeting of the Technical Council. After discussion, it was referred back to the Chairman for revision. Further discussion is expected at the forthcoming meeting.

Manual for Technical Council

In an effort to consolidate the various documents concerning the functioning and operation of the Council, the Secretary has started preparation of a Manual. It is hoped that this document will be an easy-to-refer-to handbook of all information pertaining to the Council.

Technical Sessions Committee

Because of the importance of the 1961 Committee, Mr. Carlton C. Robinson has already been appointed as Chairman of the 1961 Technical Sessions Committee. He has had several informal meetings with various people and the Council plans to start discussion of this matter at the forthcoming meeting.

Project Committee Reports Due for Completion by Annual Meeting:

Committee 2A — Career Guidance Material.

Committee 2B — Civil Service Requirements.

Committee 2H—Traffic Engineering Functions.

Committee 3C—Warrants for Speed Zones.

Committee 5A—Design Criteria for Urban Expressways.

Committee 5E—Driveway and Curb Permits and Design.

Committee 6A — Planning Criteria for Traffic Ways.

Committee 7C — Sign Illumination Techniques (Internal).

Committee 7G—Traffic Survey Devices.

New Work

Review Committee for the Technical Development and Research Fund

The Institute members of this committee have been appointed. They are: Mr. T. J. Seburn, chairman, Mr. George W. Howie and Mr. C. F. McCormack. It is understood that the industry representatives will be appointed during the Annual Meeting. An initial step has also been taken to find appropriate research uses for the money left over after paying half of the Staff Engineer's salary and his travel expenses. This step consisted of a letter to Department Heads to which was attached a questionnaire for distribution to their committee chairmen.

Review and Revision Committee for the Manual of Traffic Engineering Studies

The Institute has received the publication rights for this book from the Association of Casualty and Surety Companies. Headquarters has also received the back orders. The committee has been appointed and will meet for the first time during the Annual Meeting. Mr. Donald E. Cleveland, as Chairman, and Messrs. John W. McDonald, Edward M. Hall and E. Wilson Campbell have agreed to serve on this committee.

Partial List of New Committees Approved by the Technical Council for 1960-61:

Committee 2C—Traffic Engineering Libraries.

Committee 2D — Bibliography of Traffic Engineering References.

Committee 2E—Traffic Engineering Education.

Committee 3A — Railroad Grade Crossings.

Committee 3B—Transit Operation.

Committee 4A—Pedestrian Control Warrants and Practices.

Committee 4B—Practices and Needs in Traffic Control and Surveillance as Related to Radio Frequencies.

Committee 4C — Pavement Edge Markings.

Committee 5B—Survey and Evaluation of Freeway Design, Research and Development.

Committee 7B—Signal Colors.

Committee 7D—Traffic Signal Lamps.

Publicity

Space has been devoted in several issues of TRAFFIC ENGINEERING to a list of the committees. The latest of these is the September issue. Also, in a forthcoming issue, there will be a description of the Technical Council functions, duties and operation.

Respectfully Submitted,

GORDON GRAVELLE
Chairman, Technical Council

STRICTLY BUSINESS

(Continued from page 46)

Type-M line; the inherent efficiency of mercury vapor lighting and the sleek appearance required by today's residential communities.

To back up its confidence in the new design, the department, according to Meloun, has instituted an economical trial program for utilities and municipalities. "We're inviting them to light a block and see," he said.

New Publications

Highway Engineering Handbook
K. B. Woods, editor. McGraw-Hill Book Co., New York, N.Y. 1960. 1696 pp. $25.00.

This new handbook is the first to cover the entire range of highway planning, administration, finance, engineering, construction, and other phases of highway engineering. Forty-seven specialists contributed chapters, including several Institute members.

Text of a Model Zoning Ordinance
By Fred Bair, Jr. and Ernest R. Bartley. American Society of Planning Officials, 1313 East 60th Street, Chicago 37, Illinois. 1960. 91 pp. $2.00 (Quantity discounts)

This is the first "model" on zoning law which ASPO has ever published. It was written by a practicing planner and a professor of political science. It will serve as a textbook for courses in zoning, a guide in preparing a new ordinance or evaluating an existing one, and a reference for determining the reasons behind current zoning principles and procedures.

Section News

NEW YORK METROPOLITAN SECTION

Schedule for 1960-61 meetings (tentative):

November 17—Queens (field trip to sign study area and discussion of Sign Committee's report).

January 10—New Brunswick, New Jersey.

February 16—New York City.

March 29—Joint meeting with New England Section in Connecticut.

April 27—Hackensack, New Jersey (tour of Garden State Plaza shopping center).

(Continued on page 70)

NEW MEMBERS AND TRANSFERS

Approved by the Board of Direction, September 10, 1960

TRANSFERS FROM JUNIOR TO ASSOCIATE

ARMSTRONG, William James
Engineer of Urban Plans & Traffic, Kansas Highway Commission, Topeka, Kansas.

BARTELS, William Joseph
Senior Traffic Engineer, Edwards & Kelcey, Newark, New Jersey.

BROWN, Gerald Richardson
Regional Studies Engineer, Ontario Department of Highways, Toronto, Ontario, Canada.

CONRAD, Paul Ernest
Associate, Wilbur Smith & Associates, New Haven, Connecticut.

CRAMER, Myron F.
Associate Highway Electrical Engineer, California Department of Public Works, Division of Highways, District I, Eureka, California.

DECKER, James D.
Highway Research Engineer, Virginia Department of Highways, Council of Highway Investigation and Research, Charlottesville, Virginia.

DeSHAZO, John Jenkins, Jr.
Director of Streets & Traffic, Amarillo, Texas.

DUGAN, Dale Edwin
Special Assignments Engineer, Highway Planning Department, Kansas State Highway Commission, Topeka, Kansas.

DUNIVAN, Robert Edward
Assistant Engineer of Traffic, Traffic & Planning Division, Florida State Road Department, Tallahassee, Florida.

HARRISON, Billy John
Assistant Traffic Engineer, Traffic Engineering Department, Fort Worth, Texas.

LASH, Michael
Planning & Programing Engineer, U. S. Bureau of Public Roads, Hartford, Connecticut.

LELAND, Elmer John
City Traffic Engineer, Spokane, Washington.

LEWIS, Brian John
Associate, Whipple, Murphy, Pearson & Associates, Seattle, Washington.

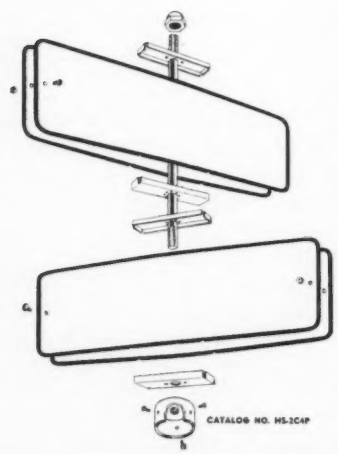
MANCINI, Rocco A.
Traffic Engineer, Edwards & Kelcey, Inc., Boston, Massachusetts.

MAY, Adolf D., Jr.
Member Technical Staff, Thompson-Ramo-Wooldridge, Canoga Park, California.

McCURDY, Bill LeRoy
Assistant Traffic Engineer, Oklahoma Department of Highways, Oklahoma City, Oklahoma.

Hawkins

THE NAME IN HIGHWAY SAFETY



ALUMINUM STREET NAME SIGN HARDWARE*

- Husky all aluminum parts exposed, center-rod hot-dipped galvanized steel for strength.
- Maintenance Free.
- Fit any width plate by varying length center rod.
- Fits all plates made, embossed or flat types.
- Caps to fit all size pipe, as well as U-Posts and electroliers.

Slotted Aluminum Hardware Also Available for Double Faced "Scotchlite" Plates

Write for literature and prices.

Manufactured by

HAWKINS-HAWKINS CO., INC.

1255 EASTSHORE HIGHWAY BERKELEY 10, CALIFORNIA

Note: Qualified Distributors Inquiries Encouraged

SPITZ, Salem
Traffic Engineer, Department of Traffic, Los Angeles, California.

WEGEL, Charles Arthur
Traffic Commissioner, Hamilton, Ohio.

WHITESIDE, Robert Erwin
Associate Traffic Engineer, Wilbur Smith & Associates, New Haven, Connecticut.

TRANSFERS FROM ASSOCIATE TO MEMBER

ANDREWS, Basil Rupert
Director, Department of Traffic Engineering, Savannah, Georgia.

AVERY, Eugene V.
Chief Engineer, Department of Public Works, St. Paul, Minnesota.

BULLOCK, Jesse Cave, Jr.
Associate Traffic & Planning Engineer, Virginia Department of Highways, Richmond, Virginia.

CARMODY, Douglas J.
Director of Parking & Traffic, Modesto, California.

GERLOUGH, Daniel L.
Head, Automobile Traffic Control Section, Thompson-Ramo-Wooldridge, Canoga Park, California.

MacDONALD, Bruce Briggs
Senior Traffic Engineer, New York State Traffic Commission, Albany, New York.

RHUDY, Harold Clingman
Area Traffic Engineer, North Carolina State Highway Commission, Raleigh, North Carolina.

STEVENS, Dudley F.
City Traffic Engineer & Parking Director, Sacramento, California.

NEW JUNIOR MEMBERS

ADAMS, Donald R.
Assistant Sign Design Engineer, Oregon State Highway Department, Salem, Oregon.

BRAMMER, Donald Doty
Traffic Planner, Metropolitan Dade County Traffic and Transportation Department, Miami, Florida.

BURNHAM, Archie Chisholm
Assistant Traffic Engineer, Georgia Highway Department, Atlanta, Georgia.

CHRIST, John Earle
Senior Traffic Engineer, New Jersey Bureau of Traffic Safety, Trenton, New Jersey.

DALTON, Thomas Joseph, Jr.
Traffic Engineer, St. Louis County Division of Traffic, Clayton, Missouri.

DARNELL, Aaron D.
Assistant Traffic Engineer, Riverside, California.

DISHER, Jerrold Ward
Assistant Department Head, Highways Branch, C. C. Parker & Associates, Ltd., Hamilton, Ontario, Canada.

GALATI, Joseph V.
Traffic Engineer II, Pennsylvania Department of Highways, Harrisburg, Pennsylvania.

HEALD, Kenneth L.
Programming Engineer, Iowa State Highway Commission, Ames, Iowa.

HICKS, Thomas
Senior Traffic Engineer, New Jersey Bureau of Traffic Safety, Trenton, New Jersey.

HUSK, Clyde Richard
Traffic Planning & Design Engineer, Metropolitan Dade County Traffic & Transportation, Miami, Florida.

ISAAC, Walter Mark
Planning Engineer, Pierce County Road Department, Tacoma, Washington.

JARED, William Joel
Traffic Engineering Assistant, Department of Traffic, Los Angeles, California.

KANEKO, Edwin T.
Graduate Student (Highway Transportation), Michigan State University, East Lansing, Michigan.

LOVETT, Perry Don
Traffic Engineer, Traffic Department, Kansas City, Missouri.

McLAUGHLIN, Wallace Alvin
Senior Traffic Engineer, Saskatchewan Department of Highways, Regina, Saskatchewan, Canada.

ORNE, Donald Edward
Assistant District Traffic Engineer, Michigan State Highway Department, Jackson, Michigan.

REED, Marshall Foster, Jr.
Senior Highway Planning Engineer, Penn-Jersey Transportation Study, Philadelphia, Pennsylvania.

RICE, Sheldon
Traffic Engineer, Wilbur Smith & Associates, San Francisco, California.

SAUNDERS, John Gordon
Regional Traffic Engineer, Ontario Department of Highways, London, Ontario, Canada.

SOKOL, Donald Anthony
Civil Engineer II, District #10, Illinois Division of Highways, Chicago, Illinois.

TAYLOR, George Edmondson
Junior Traffic Engineer, DeLeuw, Cather & Co. of Canada Ltd., Toronto, Ontario, Canada.

THOMAS, Albert Lee, Jr.
Planning Engineer, Traffic & Planning Division, Virginia Department of Highways, Richmond, Virginia.

WEST, Kenneth Edwin
Assistant District Traffic Engineer, Michigan State Highway Department, Portage, Michigan.

WILDERMUTH, Bruno Roland
Traffic Engineer, City Planning Division, City Department of Public Works, Biel, Switzerland.

WILSON, Laurence
Associate Planner, Office of City Engineer, Transportation & Traffic Engineering, San Diego, California.

WOEHRLE, Albert Hans, Jr.
Traffic Analyst, Penn-Jersey Transportation Study, Philadelphia, Pennsylvania.

WOZNIAK, Joseph J.
City Traffic Engineer, Joliet, Illinois.

PARK-O-METER PRODUCES PROFIT

Whether your city has on-street or off-street parking problems, Park-O-Meter can be utilized to produce profits.

Park-O-Meters are automatic and accurate. They can be adjusted *on the site* for time, rate and coin changes, thereby eliminating costly shop maintenance and overhead.

Park-O-Meter parts are precisely engineered and skillfully built of finest quality brass, copper and stainless steel. They pay for themselves quickly and continuously.

Let a Park-O-Meter parking expert show you how you can have a profitable parking meter system.

CLIP THIS COUPON

_____I would like to have more information.

_____Please have a Park-O-Meter representative call.

Name_____Title_____

City _____

State _____

MAGEE-HALE PARK-O-METER COMPANY

3909 Willow Springs Road • Oklahoma City, Oklahoma

NEW ASSOCIATE MEMBERS

ARGUE, Alan Edward
Acting Urban Studies Engineer, Ontario Department of Highways, Toronto, Ontario, Canada.

BARBE, Hans B.
Partner, Seiler & Barbe, Construction Engineers for Traffic, Zurich, Switzerland.

BEACH, Frank Chester
Assistant Planning Engineer, Wayne County Road Commission, Detroit, Michigan.

BRITTSAN, Ralph Moore
Assistant Highway Engineer, California Division of Highways, Stockton, California.

CILETTI, Vincent
Assistant Programming and Planning Engineer, U. S. Bureau of Public Roads, Columbus, Ohio.

COVAULT, Donald Orville
Associate Professor of Civil Engineering, Georgia Institute of Technology, Atlanta, Georgia.

CROSSETTE, Joseph G.
Traffic Analyst, Arizona Highway Department, Phoenix, Arizona.

DUNDAS, William A.
Assistant Traffic Engineer, County of Contra Costa, Martinez, California.

FERREIRA DO NASCIMENTO, Alberto Dias
Portuguese Division of Highways, Lisbon, Portugal.

FORRISTAL, John J.
City of San Leandro, California.

MALONE, William James
President, De Leuw Cather & Co. of Canada, Toronto, Ontario, Canada.

McCAULEY, Lt. Col. Clark Richard
Chief, Highways for National Defense Division, Department of the Army, Washington, D. C.

MELCHEN, Edward W.
Assistant Engineer, Department of Public Works, Ithaca, New York.

MORRIS, Robert Louis
Senior Planner—Transportation, Downtown Progress, Washington, D. C.

NORDFELT, Charles Raymond
District Traffic Engineer, California Division of Highways, San Francisco, California.

PALMATEER, James Clayton
Traffic Operations Engineer, Office of King County Engineer, Seattle, Washington.

PEGRUM, Brian Valentine
Engineer in charge of Investigations & Research Section, Traffic Engineering Branch, and Assistant to Traffic Engineer in Administration, Main Roads Department, Perth, Western Australia.

PETERSMEYER, Warren Wrede
Traffic Engineer, Regina, Saskatchewan, Canada.

POIRIER, Paul Edward
Assistant Traffic Engineer, Montana Highway Commission, Helena, Montana.

ROBERTS, James Samuel
Divisional Engineer (General), City Engineer's Department, Wellington, New Zealand.

SCHMITT, William, Jr.
Planning & Programming Engineer, New Jersey Division Office, U. S. Bureau of Public Roads, Trenton, New Jersey.

SCHUMACHER, Sheldon
Civil Engineer III, City Department of Public Works, Bureau of Engineering, Chicago, Illinois.

SIFRER, Albert
Assistant District Engineer of Design, Illinois Division of Highways, Chicago, Illinois.

SUNDE, Glenn R.
Village Engineer & Village Traffic Engineer, Oak Park, Illinois.

NEW MEMBERS

RAINVILLE, Walter Stewart, Jr.
Director of Research, American Transit Association, New York, New York.

ROBINSON, Michael
City Traffic Engineer, Bureau of Street Traffic, Chicago, Illinois.

RE-INSTATED AS MEMBER

MILLS, Edwin L.
Traffic Engineer, Alaska Department of Public Works, Anchorage, Alaska.

NEW AFFILIATE

BUGGE, William A.
Director of Highways, State of Washington, Olympia, Washington.

YEARBOOK CHANGES

ANDREWS, Basil R. (Member)
Director, City Traffic Engineering Dept., P. O. Box 1038, Savannah, Georgia. ADams 6-8965.

ARGUE, Alan Edward (Associate)
Acting Urban Studies Engineer, Planning & Design, Ontario Department of Highways, Parliament Buildings, Toronto 2, Ontario, Canada. CHerry 4-2571. SEND MAIL: 194 Moore Avenue, Toronto 7, Ontario, Canada.

AVERY, Eugene V. (Member)
Chief Engineer, Department of Public Works, City, 234 City Hall, St. Paul, Minnesota. CApital 4-4612, ext. 438.

BASARAN, Suat (Junior)
Highway Engineer, D. C. Department of Highways & Traffic, Room 210 District Building, Washington 4, D. C. NAtional 8-6000, ext. 3485.

BEACH, Frank C. (Associate)
Assistant Planning Engineer, Planning Division, Wayne County Road Commission, 7th Floor, City-County Building, Detroit 26, Michigan. WOodward 2-7670. SEND MAIL: 590 Byron Avenue, Plymouth, Michigan.

BOESEL, John L. (Junior)
Traffic Technician, Traffic Division, Idaho Department of Highways, 155 South 8th Street, Boise, Idaho. 4-5811, ext. 263. SEND MAIL: 7700 Overland Road, Boise, Idaho.

BRAMMER, Donald D. (Junior)
Traffic Planner, Planning Division, Department of Traffic & Transportation of Dade County, 850 N. W. 23rd Street, Miami, Florida. FRanklin 7-5861. SEND MAIL: 2737 N. W. Fourth Street, Miami 35, Florida.

BROWN, Gerald R. (Associate)
Regional Studies Engineer, Department of Highways of Ontario, Parliament Building, Toronto, Ontario, Canada. CHerry 4-2571, evt. 562.

BROWN, Richard C., Jr. (Junior)
Associate Traffic Engineer, Virginia Department of Highways, 1221 E. Broad Street, Richmond 19, Virginia. MIlton 4-4111.

BUGGE, William A. (Affiliate)
Director of Highways, State Highway Commission, Transportation Building, Olympia, Washington. FLeetwood 2-5611, ext. 730.

BULLOCK, Jesse C., Jr. (Member)
Associate Traffic & Planning Engineer, Traffic and Planning Division, Virginia Department of Highways, 1221 E. Broad Street, Richmond 19, Virginia. MIlton 4-4111, ext. 2844. SEND MAIL: 8221 Rambler Drive, Richmond 28, Virginia.

BURNHAM, Archie C., Jr. (Junior)
Assistant Traffic Engineer, Georgia Highway Department, #2 Capitol Square, Atlanta, Georgia. 443-5967. SEND MAIL: 3807 Poplar Drive, Clarkston, Georgia.

CARMODY, Douglas J. (Member)
Director, Parking & Traffic, City, P. O. Box 642, 801 Eleventh Street, Modesto, California. LAmbert 4-4011, ext. 241.

CARPENTER, John C. (Member)
Jayhawk Hotel, Topeka, Kansas.

CILETTI, Vincent (Associate)
Assistant Programming & Planning Engineer, Columbus Ohio Division, U. S. Bureau of Public Roads, Room 333, 700 Bryden Road, Columbus 15, Ohio. CApitol 1-6411, ext. 333.

COLEMAN, Major James E. (Associate)
Command & General Staff College, United States Army. SEND MAIL: 321-1 First Street, Ft. Leavenworth, Kansas.

CONNER, Robert E. (Associate)
Assistant Traffic Engineer, Ohio Department of Highways, 450 E. Town Street, Columbus 14, Ohio. CApital 8-5791, ext. 24. SEND MAIL: 269 Canyon Drive, Columbus 14, Ohio.

CONRAD, Paul E. (Associate)
Associate, Wilbur Smith & Associates, 495 Orange Street, New Haven, Connecticut. UNiversity 5-2191. SEND MAIL: 115 Crescent Circle, Cheshire, Connecticut.

COTTAM, Roy W. (Associate)
Director of Intersection Control, Department of Traffic, 100 Gold Street, New York 38, New York. DIgby 9-0090.

COVAULT, Donald O. (Associate)
Associate Professor of Civil Engineering, Georgia Institute of Technology, Atlanta 13, Georgia. TRinity 6-4331, ext. 418.

CRAMMER, Myron F. (Associate)
Assistant District Traffic Engineer, California Division of Highways, P. O. Box 1012, Eureka, California. HIllside 2-5761, ext. 234. SEND MAIL: 7157 Humbeldt Hill Road, Eureka, California.

DALTON, Thomas J., Jr. (Junior)
Traffic Engineer, St. Louis County Division of Traffic, 115 N. Meramec, Clayton 5, Missouri. PArkview 1-8355.

DARNELL, Aaron D. (Junior)
Assistant Traffic Engineer, City Hall, Riverside, California. OVerland 6-7575, ext. 246. SEND MAIL: 3612 Geary Place, Riverside, California.

DECKER, James D. (Associate)
Highway Research Engineer, Va. Council of Highway Investigation, Box 3817 University Station, Charlottesville, Virginia. 2-7042.

DESHAZO, John J., Jr. (Associate)
Director of Streets & Traffic, City, Box 1971, Amarillo, Texas. DRake 2-8329.

DISHER, Jerrold Ward (Junior)
Assistant Department Head, Highways Branch, C. C. Parker & Assoc., Ltd., 795 Main Street W., Hamilton, Ontario, Canada. JAckson 8-8691. SEND MAIL: 47 Mayfair Circle, Dundas, Ontario, Canada.

DUGAN, Dale E. (Associate)
Special Assignments Engineer, Highway Planning Department, Kansas State Highway Commission, State Office Building, Topeka, Kansas. CEntral 5-0011, ext. 481.

DUNIVAN, Robert E. (Associate)
Assistant Engineer of Traffic, Traffic & Planning Division, Florida State Road Department, Holland Building, Tallahassee, Florida. 2-8050, ext. 268. SEND MAIL: 610 N. Magnolia Drive, Tallahassee, Florida.

FOXWORTH, DeVere M. (Junior)
Associate Traffic Engineer, Wilbur Smith & Associates, 495 Orange Street, New Haven, Connecticut. UNiversity 5-2191. SEND MAIL: 11 Mont Street, Woodmont, Connecticut.

GALATI, Joseph V. (Junior)
Traffic Engineer II, Traffic Engineering Bureau, Pennsylvania Department of Highways, 21st and Herr Streets, Harrisburg, Pennsylvania. CEdar 8-5151, ext. 2771. SEND MAIL: 1806 Green Street, Harrisburg, Pennsylvania.

GERLOUGH, Daniel L. (Member)
Head, Automobile Traffic Control Section, Ramo-Wooldridge, a division of Thompson Ramo Wooldridge, Inc., 8433 Fallbrook Avenue, Canoga Park, California. DIamond 6-6000. SEND MAIL: 1251 Las Lomes Avenue, Pacific Palisades, California.

GOODMAN, Leon (Junior)
Transportation Planner, Port of New York Authority, 111 Eighth Avenue, New York 11, New York. ALgonquin 5-1000, ext. 8063.

GRIMM, Vincent E., Jr. (Junior)
Department of Engineering, City, 3332 Pan American Drive, Miami 33, Florida. FRanklin 1-7411, ext. 4301.

HALL, Edward M. (Member)
Street Improvement Administrator, City of Phoenix, City Hall, Phoenix, Arizona. SEND MAIL: 301 E. La Mar Road, Phoenix, Arizona.

HARRISON, Billy J. (Associate)
Assistant Traffic Engineer, City, 263 West 10th, Fort Worth 2, Texas. EDison 2-7241.

HEALD, Kenneth L. (Junior)
Programming Engineer, Computing Center, Iowa State Highway Commission, Ames, Iowa. CEdar 2-7251, ext. 246.

HICKS, Thomas (Junior)
Senior Traffic Engineer, Bureau of Traffic Safety, New Jersey Department of Public Safety, 32 E. Hanover Street, Trenton, New Jersey. EXport 6-2555, ext. 388. SEND MAIL: 107 Franklin Avenue, Ocean Grove, New Jersey.

ISAAC, Walter M. (Junior)
Planning Engineer, Traffic & Planning, Pierce County Engineer, County-City Building, Tacoma, Washington. FUlton 3-3311, ext. 655. SEND MAIL: 220 South Tacoma Avenue, Tacoma 3, Washington.

JARED, William Joe (Junior)
Traffic Engineering Associate, City, Department of Traffic, 200 N. Spring, City Hall, Los Angeles, California. MAdison 4-5211, ext. 3548.

LASH, Michael (Associate)
Planning & Programming Engineer, U. S. Bureau of Public Roads, 248 Farmington Avenue, Hartford, Connecticut. JAckson 4-8311, ext. 160.

LEOPOLD, Robert (Affiliate)
Managing Director, Atlanta Traffic & Safety Council, Suite 1320 Commerce Building, 34 Broad Street, Atlanta 3, Georgia.

LEWIS, Brian J. (Associate)
Associate, Whipple, Murphy, Pearson & Associates, 200 Broadway, Seattle 22, Washington. MAin 3-7234.

LOVETT, Perry Don (Junior)
Traffic Engineer, City, Traffic Department, 414 East 11th Street, Kansas City 6, Missouri. BAltimore 1-1400, ext. 282.

MACDONALD, Bruce B. (Member)
Senior Traffic Engineer, New York State Traffic Commission, 95 Washington Avenue, Albany 1, New York. HObart 2-7511, ext. 5273. SEND MAIL: 69 The Crossway, Delmar, New York.

MALONE, William J. (Associate)
President, De Leuw, Cather & Co. of Canada, Ltd., 1491 Yonge Street, Toronto, Ontario, Canada. WAlnut 5-3124.

MANCINI, Rocco A. (Associate)
Traffic Engineer, Edwards & Kelcey, 470 Atlantic Avenue, Boston 10, Mass. LIberty 2-4576.

MAY, Adolf D., Jr. (Associate)
Ramo Wooldridge, 8433 Fallbrook Avenue, Canoga Park, California. DIamond 6-6000, ext. 3132.

McCAULEY, Lt. Col. C. Richard, T. C. (Associate)
Chief, Highways for National Defense, Office of Chief of Transportation, Department of the Army, Washington 25, D. C. OXford 7-2495.

MELCHEN, Edward W. (Associate)
Assistant Engineer, City Department of Public Works, City Hall, Ithaca, New York. 2-1880. SEND MAIL: 853 Troy Road Ithaca, R. D. 4, N. Y.

MILLS, Edwin L. (Member)
State Traffic Engineer, Division of Highways, 1224 E. Seventh Avenue, Anchorage, Alaska. BRoadway 2-7301.

MORRIS, Robert Louis (Associate)
Senior Planner, Transportation Division, Downtown Progress, 711 Fourteenth Street, N. W., Washington 5, D. C. EXecutive 3-8387. SEND MAIL: 3715 Washington Avenue, Baltimore 7, Maryland.

NORDFELT, Charles R. (Associate)
District Traffic Engineer—Dist. IV, California Division of Highways, 150 Oak Street, San Francisco 2, California. UNderhill 3-0222. SEND MAIL: 1790 Eighth Avenue, San Francisco 22, California.

ORNE, Donald E. (Junior)
Assistant District Traffic Engineer, Michigan State Highway Department, 2900 Clinton Road, Jackson, Michigan. STate 4-7172.

PALMATEER, James C. (Associate)
Traffic Operations Engineer, King County Engineer, 905 County-City Building, Seattle, Washington. MAin 2-5900, ext. 575. SEND MAIL: 17729 Twelfth Ave., N. E. Seattle 55, Washington

PEGRUM, Brian Valentine (Associate)
Investigations, Operations & Research Engineer, Traffic Engineering Branch, Main Roads Department, Malcolm Street, Perth, Western Australia. MEtropolitan 21-8261. SEND MAIL: 26 Darlot Crescent, South Perth, Western Australia.

PETERSMEYER, Warren W. (Associate)
Traffic Engineer, City Hall, Regina, Saskatchewan, Canada. LAkeside 3-4641.

PLATT, Mathew (Associate)
Highway Research Engineer, D. C. Department of Highways & Traffic, District Building, Washington 4, D. C. NAtional 8-6000, ext. 3329. SEND MAIL: 2212 Colston Drive, Silver Spring, Maryland.

POIRIER, Paul (Associate)
Assistant Traffic Engineer, Montana Highway Commission, Sixth and Roberts, Helena, Montana. HIckory 2-3260, ext. 239. SEND MAIL: 200 South Cooke, Helena, Montana.

RAINVILLE, Walter S., Jr. (Member)
Director of Research, American Transit Association, 355 Lexington Avenue, New York 17, New York. YUkon 6-4370.

RHUDY, Harold C. (Member)
Area Traffic Engineer, Traffic Engineering Department, N. C. State Highway Commission, Raleigh, North Carolina. TE 4-3611, ext. 578.

RICE, Joseph F. (Associate)
Chief, Investigations, Survey, Inventory & Research Division, D. C. Department of Highways & Traffic, District Building, Washington 4, D. C. NAtional 8-6000, ext. 3227. SEND MAIL: 1500 North Kenilworth, Arlington 5, Virginia.

ROBINSON, Michael (Member)
City Traffic Engineer, Room 709, City Hall, Chicago 2, Illinois. RAndolph 6-8000, ext. 762.

ROSEVEARE, Robert W. (Junior)
Traffic Engineer, DeKalb County, DeKalb Building, Decatur, Georgia. DRake 3-5731, ext. 325.

SAUNDERS, John G. (Junior)
Regional Traffic Engineer, Planning Division, Department of Highways of Ontario, 335 Saskatoon Street, London, Ontario, Canada. GLadstone 1-3450.

SCHMITT, William, Jr. (Associate)
Planning & Programming Engineer, U. S. Bureau of Public Roads, 1305 Parkside Avenue, Trenton, New Jersey. EXport 4-5301, ext. 236. SEND MAIL: 5 Yorktown Road, Bordentown, New Jersey.

SIFRER, Albert (Associate)
Assistant District Engineer of Design, Illinois State Highway, 160 North LaSalle Street, Chicago 8, Illinois. FInancial 6-8000, ext. 368.

STEVENS, Dudley F. (Member)
Traffic Engineer, City, 817 Tenth Street, Sacramento 14, California. GIlbert 2-5041.

SUNDE, Glenn R. (Associate)
Director of Public Works, Village of Oak Park, 113 North Euclid Avenue, Oak Park, Illinois. EUclid 3-6400.

TAYLOR, George E. (Junior)
Design Engineer, DeLeuw, Cather & Co., Ltd. of Canada, 226 Sparks Street, Ottawa 1, Ontario, Canada. CEntral 3-9663. SEND MAIL: 1335 Coldrey Avenue, Ottawa 3, Ontario, Canada.

THOMAS, Albert Lee, Jr. (Junior)
Planning Engineer, Traffic & Planning Division, Virginia Department of Highways, 1221 East Broad Street, Richmond 19, Virginia. MIlton 4-4111, ext. 2862. SEND MAIL: New Kent, Virginia.

VAUGHN-BIRCH, Kenneth S. (Associate)
Director, Traffic Division, Engineering Department, City. 453 West 12th Avenue, Vancouver 10, B. C., Canada. TRinity 6-1313. SEND MAIL: 2638 Panorama Drive, North Vancouver, B. C., Canada.

WEGEL, Charles Arthur (Associate)
Traffic Commissioner, City, Room 301, Municipal Building, Monument & High Street, Hamilton, Ohio. TWinbrook 5-7401, ext. 28. SEND MAIL: 400 Fairhaven Drive, Hamilton, Ohio.

WEST, Kenneth E. (Junior)
Assistant District Traffic Engineer, District 7, Michigan State Highway Department, P. O. Box 6, Portage, Michigan. DAvis 7-3054, ext. 46.

WOEHRLE, Albert H., Jr. (Junior)
Traffic Analyst, Penn-Jersey Transportation Study, 51st and Parkside Streets, Philadelphia 31, Pennsylvania. TRinity 8-6100. SEND MAIL: 536 Acorn Street, Philadelphia 28, Pennsylvania.

MEMBERSHIP APPLICATIONS

The Institute of Traffic Engineers welcomes applications from qualified traffic engineers, but does not desire as members persons who are unqualified. Listed below are the names of those from whom applications for membership or transfer in grade have been received since the last published list. Institute members are urged to review this as soon as possible and immediately inform the Executive Secretary's office if names of people are found who are known to be unqualified for ITE membership or transfer.

New Applications

EGLY, Maurice Lee
Assistant to Engineering Director—Keystone Automobile Club, 220 S. Broad Street, Philadelphia, Pennsylvania—for ASSOCIATE.

FOSTER, Glyde Barton
Highway Traffic Technician -C- Virginia Department of Highways, 1221 East Broad Street, Richmond, Virginia—for ASSOCIATE.

FRITSCHE, Roland H.
Traffic Engineer—Milwaukee County Department of Public Works, Expressway Division, Room 9, Milwaukee County Court House, Milwaukee 3, Wisconsin—for ASSOCIATE.

HOCKING, Richard Jon
Assistant City Engineer & Director of Public Works, City Hall, Two Rivers, Wisconsin—for JUNIOR.

HURT, William Desmond
Regional Town Planning Officer—Northern Rhodesia Government, P. O. Box 1296, Ndola, Northern Rhodesia—for JUNIOR.

STATHOPOULOS, George T.
Director (Member of the Board) and Engineer Consultant—Organization for the Prevention of Accidents, 4, Kornarou Street, Athens, Greece—for ASSOCIATE.

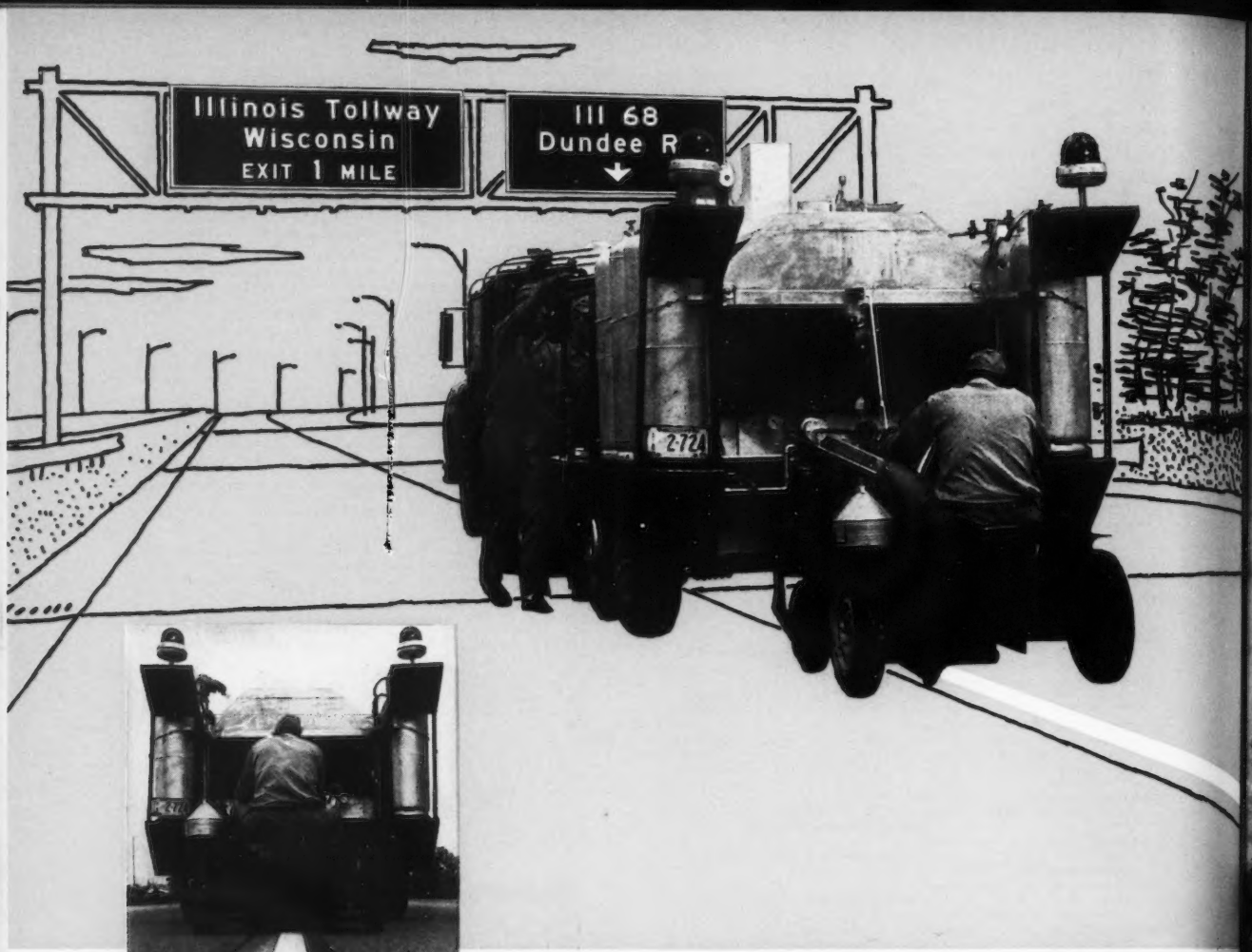
Applications for Transfer

COCHRAN, George Alton
Senior Traffic Analyst—Traffic & Planning Section, Louisiana Department of Highways, Box 4245, Capitol Station, Baton Rouge, Louisiana—for ASSOCIATE.

HOMBURGER, Wolfgang Selmar
Assistant Research Engineer—Institute of Transportation and Traffic Engineering, University of California, 1301 S. 46th Street, Richmond, California—for ASSOCIATE.

SHIATTE, Kenneth Wayne
Traffic Engineer—Buchart Engineering, 55 S. Richland Street, York, Pennsylvania—for ASSOCIATE.

SHREVE, Frank Thomas
Assistant Traffic Engineer—City, Room 403 City Hall, Long Beach, California—for ASSOCIATE.



Cataphote crew lays long-lasting Catatherm on Eden's Expressway—Chicago.

Cleanly extruded Catatherm hits and bonds to pavement at approximately 400° F. Stripe is traffic-ready 3 to 6 minutes later.

Catatherm Reflective Thermoplastic Striping goes down easy . . . stays down longer

This is Eden's Expressway on Chicago's North Side . . . one of the world's busiest thoroughfares. Pavement markings of ordinary traffic paint have little chance of survival here.

To solve the problem of "short life" markings, the Illinois State Highway Department turned to Catatherm . . . Cataphote's reflective thermoplastic striping material. Composed of specially formulated thermoplastic resins, pigment and over 40% reflective traffic beads, Catatherm is hot extruded directly and securely onto any pavement . . . is available in white and yellow. Cataphote waterproof drop-on traffic beads, applied simultaneously with the extruding operation, provide immediate all-weather reflectance . . . add longer life to the stripe.

Catatherm can mean a brighter safety picture for *you* in the actual striping operation. Striping equipment at work creates a traffic hazard . . . the possibility of accident is always present. Drastically reduce restriping and this danger is virtually eliminated. You can do this with Catatherm . . . it outlasts good quality paint stripes from 9 to 26 times . . . saves plenty of maintenance dollars, too.

Pace setters in traffic control have recognized the advantages of Catatherm. Now, they "STRIPE IT . . . AND FORGET IT." Like to be a leader, too? Let us tell you more about Catatherm. Write for Catalog C-160.

CATAPHOTE CORPORATION

TOLEDO 10, OHIO / JACKSON, MISSISSIPPI

MANUFACTURERS OF REFLECTIVE TRAFFIC CONTROL PRODUCTS

traffic control by RADIO
"Splendid results throughout the city and particularly on the main arteries . . ." are being achieved in Washington, D.C. with the new Radio Traffic Control System, according to Engineer Commissioner Alvin Welling.
Motorola now offers you greater traffic control efficiency, flexibility and economy—city-wide or individual intersection control from a central station.
Efficiency . . . high speed, high capacity automatic programming supplemented by instantaneous pushbutton control of any function.
Flexibility . . . programs can be changed instantly when required. Intersection units can be easily relocated. Expansion simply requires the addition of intersection units.
Economy . . . radio provides control at less cost per intersection and at far greater distances from the central control point.
Reliability . . . completely transistorized intersection units, combined with modular plug-in construction, facilitate servicing, interchanging of components, and additions.
Proved on-the-job, radio control stands ready to help you meet rapidly mounting traffic problems, simply and economically. Let us show you how.
MOTOROLA
RADIO TRAFFIC CONTROL
Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Illinois
A Subsidiary of Motorola Inc.

Professional Service Directory

DE LEUW, CATHER & COMPANY
CONSULTING ENGINEERS

Public Transit — Subways
Traffic & Parking — Railroad Facilities
Expressways — Industrial Plants
Grade Separations — Municipal Works
Urban Renewal — Port Development

150 North Wacker Drive, Chicago 6
San Francisco · Toronto · Boston

Traffic - Parking - Highways - Transit - Design Consulting - Financing Aids
City Planning - Urban Redevelopment

E. A. BARTON and ASSOCIATES
• *Consultants* •
Cleveland Transit Building • Cherry 1-0600 • Cleveland 14, Ohio
San Francisco • Baltimore • Toronto • St. Louis

TRAFFIC
TRANSPORTATION PARKING

THE CLARKESON ENGINEERING COMPANY INCORPORATED

285 Columbus Ave., Boston 16, Mass.
COmmonwealth 6-7720
HIGHWAYS AIRPORTS

TRAFFIC TRANSPORTATION PARKING
EXPRESSWAYS AIRPORTS PUBLIC WORKS
Surveys — Reports — Design — Supervision

EDWARDS AND KELCEY
Engineers and Consultants
3 William Street, Newark 2, New Jersey
Boston · Salt Lake City · New York
Providence · Minneapolis

YOUR CARD
could be set in this space at a very reasonable rate.
If interested, please write
2029 K STREET NW
WASHINGTON 6, D.C.

TRAFFIC-WISE PROCESS CO.
520 Fifth Ave. New York 36, N.Y.
Methods for progressing heavy traffic in small block cities. Primary-secondary co-ordination with high expediting power. Systematic coordination between highway and street traffic.
John K. Masten, Consultant
Pats. 3,926,332—3,926,333

TRAFFIC RESEARCH CORPORATION LTD.
TRANSPORTATION PLANNING FOR METROPOLITAN AREAS AND HIGHWAY SYSTEMS
Traffic Signal Systems — Origin and Destination Surveys
Expressway and Public Transit Assignments
Traffic Surveys — Economic and Distribution Studies — Traffic Simulations
20 Spadina Road, Toronto 4, Canada

SECTION NEWS

(Continued from page 63)

May 13—Ladies night.

June 6—New York City (business meeting).

For further information on exact place and time, contact Paul C. Petrillo, Secretary-Treasurer, N. Y. Metropolitan Section, c/o Automobile Club of New York, Madison Avenue at 78th Street, New York City. Telephone: REgent 4-8700.

PUERTO RICO SECTION

The members of the Puerto Rico Local Section of the ITE met at the "Colegio de Ingenieros" Building in San Juan, on Tuesday, August 30, 1960 for the main purpose of selecting the officers for the current fiscal year.

After briefly discussing the problems faced by the Section since its creation, it was decided unanimously to re-elect last year's board of directors composed as follows:

President—Mr. Victor M. Labiosa
Vice President—Mr. Ramiro Ramfrez
Treasurer—Mr. William Vivoni, Jr.
Secretary—Mr. Juan F. Vives

INDEX TO ADVERTISERS

Automatic Signal Division of Eastern Industries	4
Cataphote Corporation	68
Crouse-Hinds Company	9
Douglas Fir Plywood Association	36 & 37
Duncan Parking Meter Company	3
Eagle Signal Company	6
Flex-O-Lite Manufacturing Company	61
Hawkins-Hawkins Company	64
Lyle Signs, Inc.	45
Magee-Hale Parking Meter Co.	65
Marbelite Company	47
Minnesota Mining & Manufacturing Co.	2
Miro-Flex Company	55
Motorola Communications & Electronics, Inc.	69
The Planet Corporation	41
Prismo Safety Corporation	Back Cover
Radiator Specialty Company	8
B. G. Reilly Company	49
Stimsonite (Elastic Stop Nut Corporation)	10
Thiokol Chemical Corporation	59
Time-O-Matic, Inc.	44
Traffic Signals, Inc.	57
Union Metal Manufacturing Company	53

Professional Service Directory

TRAFFIC ENGINEERING — HIGHWAY PLANNING

BRUCE CAMPBELL & ASSOCIATES
ENGINEERS

177 MILK STREET • BOSTON 9

PARKING — AIRPORTS — SHOPPING CENTERS

PARSONS, BRINCKERHOFF QUADE & DOUGLAS

Engineers

Bridges, Highways, Tunnels, Airports, Subways, Harbor Works, Dams, Canals, Traffic, Parking and Transportation Reports, Power, Industrial Buildings, Housing, Sewerage and Water Supply.

165 Broadway — New York 6, N. Y.

CRAWFORD, MURPHY & TILLY
CONSULTING ENGINEERS

Water Works - Impounding Reservoirs
Highway - Municipal Streets - Expressways
Traffic Problems - Airports
Swimming Pools
Sewers - Sewage Treatment
Waste Treatment - Storm Drainage
Flood Control - Surveys and Reports

755 So. Grand Ave., W.; Springfield, Ill.
Lakeside 8-5619

HOWARD, NEEDLES TAMMEN & BERGENDOFF

Consulting Engineers

Traffic Analyses — Transportation Studies

EXPRESS HIGHWAY PLANNING
REPORTS AND DESIGN
ADMINISTRATIVE SERVICES

1805 Grand Avenue
Kansas City 8, Missouri

New York — Cleveland

HARDESTY & HANOVER
CONSULTING ENGINEERS

BRIDGES—Long Spans of All Types
Movable—Lift, Bascule & Swing
Hanover Skew Bascule
Grade Crossing Eliminations
Other Structures — Foundations
Expressways and Thruways
Design—Supervision—Inspection
Valuation—Reports

101 Park Avenue — New York 17, N. Y.

PALMER AND BAKER ENGINEERS, INC.
CONSULTING ENGINEERS — ARCHITECTS

Surveys — Reports — Design — Supervision — Consultation

Transportation and Traffic Problems — Tunnels — Bridges — Highways — Airports
Industrial Buildings — Waterfront and Harbor Structures
Graving and Floating Dry Docks
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala. — New Orleans, La. — Washington, D.C.

S. Herbert Taylor — Frank J. Sleeper
David L. Taylor — William H. Taylor

SHERMAN, TAYLOR & SLEEPER
CONSULTING ENGINEERS

(All phases of Civil Engineering)

501 Cooper Street, Camden 2, N. J.
WOodlawn 6-2552

Park & Norwood Aves., Merchantville 8, N.J.
NOrmandy 3-4848

GANNETT FLEMING CORDDRY and CARPENTER, INC.
---ENGINEERS---

CONSULTING SERVICE FOR TRAFFIC PARKING and TRANSPORTATION PROBLEMS
City Planning — Highways — Bridges — Flood Control
Water Supply — Sewerage — Industrial Waste — Garbage Disposal
Appraisals — Investigations — Management

600 NO. 2nd STREET — HARRISBURG, PA.
Pittsburgh, Pa. — Philadelphia, Pa. — Daytona Beach, Fla. — Medellin, Colombia, S.A.

JENKINS, MERCHANT & NANKIVIL

Consulting Engineers

Municipal Improvements — Gas Systems
Highways & Airports — Water Systems
Power Development — Sewerage Systems
Traffic Surveys — Industrial Plants
Flood Control — Recreational Facilities
Investigations and Reports

801-805 East Miller St. — Springfield, Ill.

GEORGE W. BARTON & ASSOCIATES
CONSULTING ENGINEERS

Parking — Highways
Traffic — Transportation

600 Davis Street

Evanston — Illinois

RAMP CONSULTING SERVICES, INC.

Parking Programs • Feasibility Studies

RAMP ENGINEERING ASSOCIATES

Engineering and Design Services

2 West 46th Street, New York 36, N. Y.

TIPPETTS — ABBETT McCARTHY — STRATTON

Engineers
Traffic, Parking and Transportation

Surveys, Economic Studies and Financial Reports

Highways, Subways, Bridges, Tunnels—Airports, Ports, Harbors, Power Developments, Water Supply, Sewerage

Planning, Reports, Design, Supervision of Construction

375 Park Avenue — 110 Market St.
New York 22, N.Y. — San Francisco, Cal.

Highways — Transit
Traffic — Parking

WILBUR SMITH & ASSOCIATES

495 Orange Street
New Haven, Connecticut

Columbia, S.C. • San Francisco, Calif. • Richmond, Va.

HIGHWAY TRAFFIC ENGINEERS, INC.

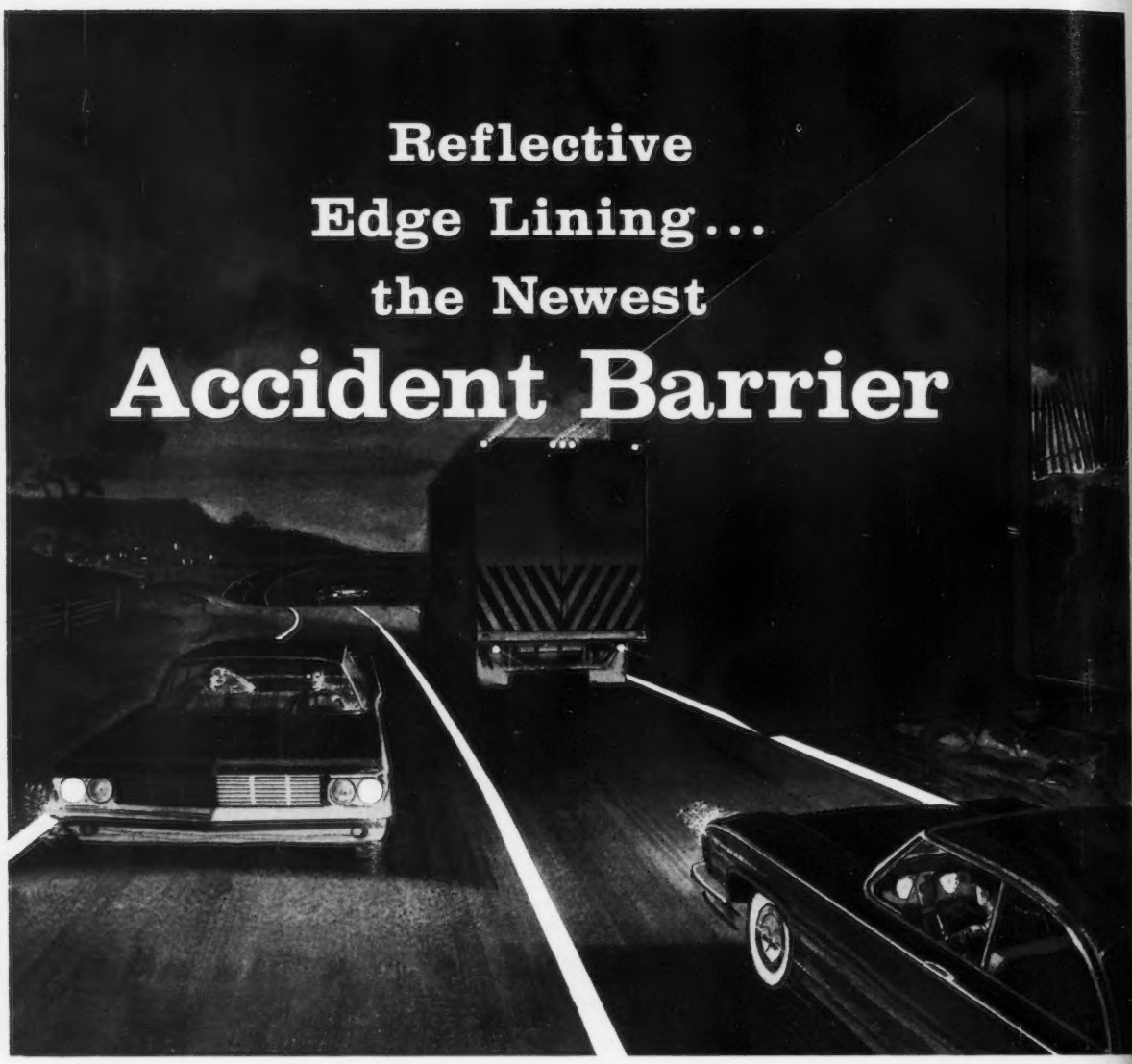
Traffic - Parking - Transportation
Economic Studies - Financial Reports
Traffic Control - Design of Lighting Systems and Communications

361 Boylston Street
Brookline 46, Massachusetts
LOngwood 6-0275

ALFRED KAEHRLE ASSOCIATES
CONSULTING ENGINEERS

Highway Planning — Highway Design
Traffic Engineering Surveys
Parking Studies — Shopping Centers

10 North Main Street
West Hartford 7 — Connecticut



More and more states are turning to edge lining as a Big Plus in modern highway safety. All but nine of the 50 states—and Canada too—are either engaged in or planning an edge line program.

One mid-western state, after edge lining some 15,000 miles of highway, reports a net reduction of 19% in sideswiping, head-on and off-side accidents, and 37% reduction in fatalities and injuries! Another state realized a 40% reduction in accidents involving vehicles leaving the right side of the road. Three other states found that shoulder encroachment by motorists was lowered as much as 50%! No wonder all but nine of our states, and Canada also, are turning to edge lining as the BIG PLUS in modern highway safety.

PRISMO, world leader in reflective highway safety markings, has long been an advocate of edge lining. The simple application of a white or yellow stripe along the right side of the highway performs miracles of protection. Night drivers tend to avoid the center line because they have a clear right shoulder guide, even when the weather's bad. And like a solid wall the PRISMO reflective edge line helps to prevent "running off the road" mishaps, cuts down shoulder damage and maintenance costs.

Edge lining definitely belongs in every highway safety program. Write us today for more details regarding application, costs and sensational accident-prevention statistics.

PRISMO

SAFETY CORPORATION

Huntingdon, Pennsylvania

all
ent
der

ay
ails
nt-

N